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100th Congress *1st Session*	SENATE	Report 100-231

CLEAN AIR STANDARDS ATTAINMENT ACT OF 1987

REPORT

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

together with

ADDITIONAL AND MINORITY VIEWS

TO ACCOMPANY

S. 1894

November 20 (legislative day, November 19), 1987.—Ordered to be printed

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CLEAN AIR STANDARDS ATTAINMENT ACT OF 1987

November 20 (legislative day, November 19), 1987.—Ordered to be printed

Mr. Mitchell, from the Committee on Environment and Public Works, submitted the following

REPORT

together with

ADDITIONAL AND MINORITY VIEWS

[To accompany S. 1894]

The Committee on Environment and Public Works reports an original bill (S. 1894) to amend the Clean Air Act to establish new requirements for areas that have not yet attained health-protective ambient air quality standards, to provide new deadlines for such attainment, to delay the imposition of sanctions, to better protect against interstate transport of pollutants, to control existing and new sources of acid deposition, and for other purposes and recommends that the bill do pass.

GENERAL STATEMENT

Introduction

The Clean Air Act is the first modern environmental law to be enacted. It was first signed into law by President Johnson in 1963, replacing previous Federal air pollution legislation. In 1965 hearings before the Special Subcommnittee on Air and Water Pollution, the Assistant Secetary of the department of Health, Education, and Welfare testified:

> [S]erious air pollution problems aris[e] from the ever-increasing use of motor vehicles, [and] our rising demands for the energy derived from burning of sulfur-bearing fuels. . . . The national importance of resolving these

> problems is beyond dispute. They are among the most significant factors in the growing and worsening air pollution problems currently faced by thousands of American communities. . . .
>
> None of these problems is technologically insurmountable. Our current technical capability for dealing with them admittedly varies from one problem to another, but even where our knowledge and skills are less refined than we would wish, there exist at least partial solutions which we have a responsibility to evaluate as rapidly as possible and to apply where feasible. (Hearing of April 6, 1965, page 22.)

This statement is still true today. Some areas of the country have improved their air quality since 1965. Over 35 million people, however, live in nonattainment areas where the air quality has declined since 1981. Over 100 million people are breathing air that does not meet the Federal health-based air quality standards.

Our knowledge about the adverse effects of exposure to air pollution has increased since 1965. Researchers have demonstrated adverse effects at levels of exposure previously presumed to be safe. Illnesses of no traumatic origin are now linked to air pollution. In some areas, for example, residents who do not smoke may have lungs as damaged as the lungs of heavy smokers, due to exposure to air pollution.

Air pollution can silently damage our lungs and heart or act swiftly in the case of exposure to toxic air pollutants. Rigorous regulation of toxic pollutants is needed to avoid risk of serious, irreversible damage.

We are routinely exposed to thousands of air pollutants emitted every day. Exposure to this mix of pollutants can produce more adverse effects than exposure to each of the individual pollutants. These synergistic effects must be considered if we are to adequately protect public health. In addition, there are many pathways of exposure to hazardous pollutants and contaminants. Exposure to polluted outdoor and indoor air, contaminated water and soil can combine to produce greater risks than exposurse through only one source.

In testimony before the Subcommittee on Environmental Protection, public health leaders acknowledged the continuing health threat posed by air pollution. The American Lung Association, the American Public Health Association, the American Academy of Pediatrics and the Director of the Environmental and Occupational Medicine at Mount Sinai Hospital all testified that further reductions in sulfur dioxide and oxides of nitrogen are warranted based on health considerations alone. This conclusion does not address the myriad of other pollutants of concern.

A Harvard researcher testified before the Subcommittee that "In every epidemiologic investigation that we have performed over the past 6 years, we have repeatedly found a 2 to 5 percent air pollution effect on human mortality and morbidity. We find it very difficult to reject these consistent findings . . .".

The health problem is serious and it is pervasive. There is no choice but to breathe the air, whether it is clean or polluted. Air is inhaled regardless of its quality. This is a national resource that should be protected as our parks and national monuments are protected.

This resource needs national controls in many cases. Air pollution recognizes no State or international borders. Aggressive controls in downwind areas will do little to improve air quality if the quality of the air entering the region is poor. States have limited resources and many additional responsibilities. Both the State and Federal Government should work together to achieve improvements in air quality.

NONATTAINMENT

The adverse health effects of exposure to photochemical oxidants (ozone) and carbon monoxide are well demonstrated. Ozone exposure causes and aggravates respiratory illness. EPA studies show adverse effects on healthy, exercising individuals exposed for two hours in an ozone chamber even to levels of ozone at the current air quality standard, 0.12 parts per million. Exposure to higher ozone concentrations produces more pronounced adverse effects.

The people most likely to be injured from exposure to ozone include the elderly, people with preexisting respiratory problems, children (who have a faster respiration rate and are thus more exposed), and approximately 20 percent of the population that has a markedly strong adverse reaction "responders".

Exposure to carbon monoxide also produces adverse effects because the carbon monoxide is more readily absorbed into the blood than is oxygen. This causes pulmonary distress, particularly for the elderly, fetuses, children, and those with heart problems or other preexisting conditions.

Many of those who are most likely to be injured by exposure to these pollutants are those who are least capable of affording the additional medical expenses, particularly the urban poor and the elderly. The American Lung Association estimates we spend $40 billion per year in additional health care costs due to exposure to air pollution.

In addition, there are the environmental effects of air pollution. In a recently released study, the American Forestry Association announced its support for Federal controls on sources of air pollutants, including hydrocarbons and nitrogen oxides. As stated in the report, "the American Forestry Association believes that the risks and costs associated with further delaying additional pollution controls now seem to outweigh the risks and cost associated with action. . . . The control program should target the nation as a whole, as the terrestrial and aquatic forest resource impacts from air pollution constitute a national threat."

Other benefits of reduced air pollution levels include greater crop yield, reduced materials damage, improved visibility, and reduced acquatic damage. Quantification of these benefits is of course more difficult than ascertaining the costs of pollution control equipment, but billions of dollars each year would be saved from better protection of valued resources from ozone-induced change alone.

While much of the health data for ozone and carbon monoxide has been produced since 1970, the need to improve air quality was clear even then. The Clean Air Act of 1970 required the Administrator of the Environmental Protection Agency (EPA) to set ambient air quality standards for, among other pollutants, photochemical oxidants and carbon monoxide. There were to be primary standards set at levels necessary to protect public health with an adequate margin of safety and secondary standards to protect the public welfare, including environment resources.

The Act required States to prepare State implementation plans (SIP's) that would impose emission controls on polluting sources and adopt other strategies to assure that all areas of the State would be in compliance with the health-based standards within three years of the time the plan was approved by EPA. The States were given nine months to submit SIP's to EPA, and EPA had four months to review and approve or disapprove them. States could request extensions of up to two years to comply with a standard if technologies to achieve needed emission reductions from particular sources were not available.

When the final deadline for attaining the health-based standards passed in 1976 and numerous areas of the country had failed to comply, Congress, in the Clean Air Act Amendments of 1977, extended the deadlines until 1982, and for areas with severe ozone or carbon monoxide problems, until 1987, but enacted a more prescriptive set of control requirements in an effort to assure that measures needed to attain the new, extended deadlines would be put in place. At the time, it was envisioned that only one or two areas would be unable to meet the 1987 deadline, assuming implementation and enforcement of aggressive air pollution control programs by Federal, State, and local officials.

Among the provisions included in the 1977 amendments were requirements for the adoption of "reasonably available control technology" on existing sources, for emission limits on new sources that would achieve the "lowest achievable emission rate", and for annual emission reductions throughout an area that exceeds a primary standard (a "nonattainment area") sufficient to bring the area into compliance with the standard by the deadline in the law. (This last provision is the "reasonable further progress" requirement of the 1977 amendments.) Areas seeking extensions until 1987 were required to implement motor vehicle inspection and maintenance programs.

In order to be granted extension of a deadline, a State had to submit a revised implementation plan for its nonattainment areas, and the plan had to include each of the requirements noted above. Conceptually, if a State implemented each of the requirements, it should attain the standards by the deadlines.

The Environmental Protection Agency refers to "numerous" areas for which plans reviewed and approved by EPA showed attainment of the ozone or carbon monoxide standards by 1982 but which failed to meet that deadline. Data is not available from EPA to show how many, if any, of those areas have achieved the standard since 1982, but at least 23 of the ozone nonattainment areas are among the 67 such areas that EPA projects will fail to comply with that standard by December 31, 1987, five years after the date both EPA and the State agreed the areas would come into attainment. In addition, 38 of the nonattainment areas that were expected to attain by 1982 received no notice of SIP inadequacy from EPA before January, 1987.

Several of the areas that failed to meet their 1982 deadline and will not attain the ozone or carbon monoxide standard by 1987 have, nonetheless, not been required by EPA to implement an I/M program, although areas needing until 1987 to meet the standard were required by the statute to institute such programs. The failure to implement this requirement means more areas are subject to sanctions for failure to meet the air quality standards.

The record of the States and EPA with respect to accurately projecting attainment of the ozone and carbon monoxide standards has not been good. The States and EPA, to the extent that they have miscalculated, have consistently underestimated the emission reductions needed for attainment. This pattern should be kept in mind by those planning future strategies for attainment.

Carbon monoxide nonattainment is a similarly persistent problem. Documents given to the Committee as recently as August, 1987, predicted that 38–54 areas would fail to meet that standard by the 1987 deadline, while the projected number in the Agency's proposed "Post 1987 Ozone and Carbon Monoxide Policy," released on November 17, 1987, projects that 88 areas are likely to miss the 1987 date.

It is in the face of the persistent inability of EPA and the States to adopt and enforce measures that will bring about healthy air quality that the Committee, once again, as in 1977, finds it necessary to legislate with more specificity than is present in existing law. Many of the requirements in the bill are merely detailed prescriptions of what the Administrator or States already have the authority, but not the will, to do. This is the case with the requirement for the use of Stage II vapor recovery controls during vehicle fueling; the requirement for, and definition of, enhanced I/M programs; the requirements for EPA to promulgate additional guidance for the States to use in determining reasonably available controls on existing sources and to issue Federal regulations for six categories of hydrocarbon emissions; the definitions of RACT and LAER; and a requirement for specific areawide percentage reductions in emissions in order to satisfy the Act's requirement for "reasonable further progress", as that term applies to areas that cannot attain the standards by December 31, 1992.

The bill also targets emissions of oxides of nitrogen (NO_x) for greater controls than is specified under existing regulations. Oxides of nitrogen, as well as hydrocarbons (HC), are precursors of ozone, and while there are uncertainties about the relationships among emissions of NO_x, HC and levels of ozone at particular geographic locations, it is clear that further reductions of NO_x are needed to reduce ozone levels nationwide.

Other provisions in the bill modify or supplement the existing Act in order to recognize new information and scientific understandings that were not available in 1977. Knowledge of the extent to which ozone can be transported and the resulting understanding of the need to control precursor emissions at distant sources if conditions in nonattainment areas downwind of the sources are to improve, led to the requirement that two ozone transport regions be established, and that certain minimum controls be required throughout the regions, whether or not a source is located in an actual nonattainment area. That same understanding led to an expanded definition of the term "nonattainment area", which assures that controls are adopted on sources of pollution over a wider area than is currently required.

Stricter emission standards for motor vehicles and provisions to improve the performance of vehicles in actual use are included in the bill, in recognition of the very significant portion of the ozone and carbon monoxide problem that is attributable to mobile sources.

The bill extends attainment deadlines for ozone and carbon monoxide in exchange for implementation by an area of the requirements specified. Sanctions are applied for the failure of an area to develop a plan that will achieve compliance with standards, for failure of an area to implement its plan, and, with appropriately conditioned and limited waivers, for failure of an area to attain standards by applicable deadlines.

This approach contrasts with the recently announced EPA post-1987 ozone and carbon monoxide strategy. The proposed policy relies almost exclusively on the States, rather than relying on the current Federal-State partnership. The policy does not effectively stay sanctions that are required under the Act and it accepts postponement of clean air. Areas concerned about exposure to sanctions have no assurance that a court will not mandate imposition of such sanctions.

EPA leaves the tough choices to the States. Federal controls can be extremely effective in controlling air pollution and are often more likely to be implemented. States have dwindling resources and some nonattainment areas do not have the authority to mandate additional pollution controls.

For example, EPA chooses not to require reduced carbon monoxide emissions from motor vehicles. The reported bill does so by extending the useful life of motor vehicles and expanding an enhanced inspection and maintenance requirement. EPA asks that localities turn instead to transportation control measures, such as ridesharing, restrictions on motor vehicle access to downtown areas, etc. While these controls will be necessary in the more severe nonattainment areas, Federal controls are more likely to be implemented and may be less controversial. This withdrawal of Federal participation is consistent with Executive Order 12612, which states in relevant part that agencies shall "refrain, to the maximum extent possible, from establishing uniform, national standards for programs". The Clean Air Act envisions a more active Federal role in partnership with States than that described in the Executive Order.

The combination of clear measures to be undertaken by EPA, clarification of the legal responsibilities to be borne by States in exchange for deadline extensions and avoidance of sanctions, and the imposition of clearly defined sanctions for future failures to implement the law, should hasten the time when all people in the nation will be able to breathe healthy air.

ACID RAIN

This bill adds a new part E to the Clean Air Act for the express purpose of reducing the emission, transport, transformation and deposition of air pollutants generally, and acid forming compounds specifically. The new part applies throughout the United States, and deals most directly with sulfur dioxide and oxides of nitrogen, although other pollutants also may be subject to regulation under this part. The bill also includes a new part F which authorizes a 5-year $5 billion program of assistance to utilities and industrial facilities demonstrating clean coal technologies at the commercial scale.

There is no credible dispute that acid rain, especially in combination with other air pollutants, is a major contributor to the burden of ill health and environmental damage in the United States. Reputable authorities, publishing their results in peer-reviewed scientific articles, have concluded that acid rain and its precursors are responsible for between 50,000 and 70,000 excess deaths per year. While these estimates have been criticized by representatives of electric utilities and others, they have withstood rigorous scrutiny by scientific critics and, if nothing else, serve to illustrate the potential magnitude of the problem: a threat to public health that claims as many lives each year as automobile accidents.

Were evidence against acid rain limited to these and other health studies, the case for a national control program designed to deal only with it might be less compelling. But it is not. On the contrary, the record is replete with indisputable evidence that acid rain and its precursors—

- —cause massive damage to buildings and other man-made structures;
- —poison lakes and streams to the extent that they can no longer support fish and other life;
- —alter the chemical composition of soils, perhaps upsetting the natural balance which enables their productive use; and
- —reduce visibility throughout the United States, sometimes to the point that it becomes an aviation hazard.

Unraveling the precise role which acid rain and its precursors play in these and other injuries is difficult because many other air pollutants, especially ozone, also pervade the North American atmosphere. These pollutants can act together, with one sometimes accelerating or aggravating the damage caused by another. Such complex relationships provide opponents of air pollution control with a convenient opportunity to assert that one pollutant should not be controlled because of the role played by another. Or, in some cases, to suggest that because certain chemical reactions which occur in the atmosphere are influenced by "natural" pollutants (e.g. the hydrocarbons emitted by trees during summer months) this would vitiate the effectiveness of any proposed acid rain control program.

Attempts to design a control program are further complicated by the inaccurate use of the term "acid rain" to describe a wide variety of injuries which may be caused by one or more air pollutants, but not necessarily acidic deposition. The widespread forest dmage spread throughout Eastern North America and Europe is a case in point.

There is agreement that the forests of Europe are dying at an alarming rate, a phenomenon called "Waldsterben" (which literally means "forest death") by the Germans. It is also evident that forests in North America are afflicted by a variety of ills. The Southern yellow pine, which is the major commercial species in the Southeastern Unites States, has doubled its mortality rate and halved its growth rate in the last two decades. Red spruce, white pine, oak, yellow and sugar maple are also suffering from differing but pronounced damages. In each case, air pollution—but not necessarily acid rain—is one of several possible causes. Nevertheless, the public and some scientists, often preceive these forest damages as due to "acid rain". The use of a misnomer does not, however, diminish the reality of the damages, nor the need for a control program to halt forest destruction whether caused by acid rain, ozone, oxides of nitrogen or other air pollutants.

The Committee bill responds to these complexities and legitimate criticisms. While some have seen these complications as a reason to take no action to control acid rain, the bill reflects the view that they are, instead, a reason to address all of the pollutants involved, rather than to take no action at all. Therefore the bill establishes a comprehensive control program to deal with acid rain.

Some of these controls are contained in title II, but others are elsewhere in the bill. For example, title II imposes some controls on oxides of nitrogen emitted by smokestack industries, but other controls on NO_x—those emitted by motor vehicles—are contained in title III. Similarly, the formation of oxidants (which many scientists believe play a role in the chemical reactions transforming sulfur dioxide into acid rain) would be limited by the provisions of both title I and title III.

Thus title II must be viewed in the context of the complete Committee bill. While title II contains the bulk of the regulatory program designed to cope with the damage being wrought by acid rain, many other important controls are situated in each of the other titles. Nevertheless, to minimize acid rain and its precursors, which is one of the overriding and dominant objectives of this legislation, requires that many of the major issues be signed out and dealth with in a free-standing title.

In 1985 the United States and Canada appointed Special Envoys to consider the cause and effects of acid deposition in both nations and to make recommendations for governmental response. In January of 1986 the Envoys issued a joint report which recommended a 5-year, $5 billion program. Half of the funding was to come from the United States government and half funded by private sponsors. The purpose of the program is to demonstrate pollution control technologies that may be more cost effective than current technology and which would further consensus on a control program in the American community.

The projects supported under this proposed program are to demonstrate technologies which can be installed through retrofit at a large number of existing powerplants and which will produce significant near-term reductions in the transboundary movement of acid rain precursor pollutants (SO_2 and NO_x) from areas within the

United States to areas within Canada. To honor the commitment made by the United States when President Reagan endorsed the Envoy's report, title II contains a clean coal technology program which is the legislative embodiment of the Envoy's recommendations.

HAZARDOUS AIR POLLUTANTS

Section 112 of the Clean Air Act provides for the regulation of hazardous air pollutants, substances which "cause or contribute to air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness".

Air pollution, rather than drinking water or food supply, is the principal source of human exposure to toxic substances. A 1981 EPA study found that toxic dosage for the typical person was greater from air pollution than from drinking water for 13 of the 16 pollutants for which a comparison could be made.

According to a 1985 EPA study, just 17 toxic air pollutants cause an estimated 2,000 excess cancers in the United States each year. This estimate does not account for the carcinogenic effects of hundreds of other toxic air pollutants (States have established concentration limits for 708 different air toxics) or the negative health effects other than cancer which can be attributed to toxic emissions, including birth defects, sterility, central nervous system damage, mutations, organ toxicity, and irritation of eyes, nose, throat and skin.

It is not only the national cancer toll that is of concern. Another important aspect of the air toxics problem is an equity issue. The risks associated with exposure to toxic air pollutants are not spread evenly over the whole population. Those living near concentrated industrial activity may face very high lifetime cancer risks due to toxic emissions. Estimates by EPA indicate that some persons living near industrial facilities routinely releasing hazardous air pollutants may experience an increased cancer risk in the range of 2 in 100 (with some serious emissions problems projected to cause 3 excess cancers for every 10 persons exposed).

The problem of high individual risk reaches beyond those living near large point sources to include millions of other Americans living in heavily-polluted urban centers. EPA's 1985 study also looked at risks from the mix of chemicals present in urban airsheds. It was common to find an additive risk for 15 to 20 pollutants in the range of 1 excess cancer for every 1000 persons. A recent study of the air toxics problem in the Los Angeles metropolitan area indicated that as many as 222 cancers per year in that community could be attributed to toxic air pollutants (principally benzene emitted from gasoline supplies).

There are also environmental effects from these pollutants. For instance, 20 to 25 percent of all the toxic pollutants reaching the Great Lakes are generated as air emissions and are deposited from the atmosphere. An estimated 80 percent of the toxic loading for Lake Superior is thought to originate from air deposition.

Section 112 of the Clean Air Act requires the Administrator to publish a list of the hazardous air pollutants for which he intends to promulgate an emissions standard. In the 17-year history of the Clean Air Act, just eight substances have been listed as hazardous air pollutants: asbestos; beryllium; mercury; vinyl chloride; radionuclides; inorganic arsenic; benzene; and coke oven emissions. NESHAPs (National Emission Standards for Hazardous Air Pollutants) have been promulgated for sources of seven of these pollutants.

To most observers—and considering the evidence that dozens of air toxics pose significant risks to public health—this seems to slow a pace. At various times the Agency has had under review from 37 to 184 different substances for priority attention. But very few standards have resulted. In 1983 the General Accounting Office issued a report on the NESHAP standard-setting process that identified the following causes of delay: (1) fear of eventual legal challenge has caused EPA to expend extraordinary effort preparing the health assessment documents which support standards; (2) the process for reviewing health assesments is cumbersome and bureaucratic; (3) the assessment process is conducted in sequential stages moving from toxicity to exposure to emissions to controls before a standard can finally be promulgated; and (4) basic policies with respect to standard-setting have shifted significantly from one approach to another over the life of the program.

Efforts have been made to accelerate the standard-setting process. In 1977 EPA identified 43 pollutants as high priorities for review. In 1982 the list was trimmed to 37. In 1983 Administrator Ruckelshaus promised to make regulatory decisions on 20 to 25 of these pollutants by the end of 1985. Although EPA has put some of these pollutants on an agenda for future regulation, only one has been listed (coke oven emissions) and for that pollutant no standard has been promulgated. No significant reductions in emissions or improvement in public health protection has resulted from a priority-setting process begun in 1977.

In 1985 the Agency took its air toxics program in a very different direction. It decided to emphasize the small, diverse and non-traditional area sources of air toxics like wood stoves, dry cleaners and motor vehicles. It moved away from the activities leading to emissions standards under section 112 and toward other parts of the Clean Air Act (new source performance standards) and other statutes (TSCA) to find regulatory tools to deal with air toxics. It also sought to increase State and local capacity to regulate large, high-risk point sources of emissions and to make local governments more aware of the extremely hazardous substances with a potential for catastrophic release that are used within their communities. Although there are promising aspects to this comprehensive strategy, again, little in the way of actual emissions reductions has resulted from the high profile public commitments that were made.

To some extent the statutory language itself may be responsible for the slow pace of the Nation's air toxics program as it requires emissions standards which provide an ample margin of safety to protect public health even for carcinogenic air pollutants where no level of exposure may be considered safe. If interpreted to require standards prohibiting emissions, regulations under section 112 would be potentially very costly for some source categories or pollutants.

In recent weeks even the few standards which the Agency has actually promulgated have been called into question by court challenge (*NRDC* v. *EPA*, 824 F.2nd 1146) of a 1985 decision with respect to vinyl chloride. In a landmark case, the Court of Appeals for the D.C. Circuit ruled that cost effetiveness or feasibility cannot be used as a point-of-departure for the NESHAPs promulgated under section 112. Rather the Agency must begin by identifying a "safe" level of emissions, before considering the feasibility of control. Under this ruling, the Agency may be required to reissue already proposed or promulgated standards for four pollutants in addition to vinyl chloride—benzene, radionuclides, arsenic, and coke oven emissions. This decision is not likely to accelerate the standard-setting process; more likely additional months will pass before fundamental standard-setting policies are re-oriented to incorporate the instructions of the Court.

In light of these observations, the reported legislation makes fundamental changes in the basic provisions of section 112. The bill establishes a list of 224 air pollutants and a mandatory schedule for issuing emissions standards for the major sources of these pollutants. The standards are to be based on the maximum reduction in emissions which can be achieved by application of best available control technology. These new, technology-based standards will become the principal focus of activity under section 112. Authority to issue health-based standards is preserved in modified form to be used for especially serious pollution problems.

A December, 1984, release of methyl isocyanate, a highly reactive and toxic gas, from a facility in Phopal, India which killed 2,850 and injured more than 200,000 others has broadened the focus of concern for air toxics from the continuous, routine emissions addressed in the 1970 Act to include the release of extremely hazardous substances as the result of chemical accidents.

Sudden, catastrophic events that release extremely hazardous substances are a significant (and perhaps, increasing) threat to public health and safety in the United States. A report by the Environmental Protection Agency called the Acute Hazardous Events data base recorded 6,928 chemical accidents causing 138 deaths, 4,717 injuries and the evacuation of 217,000 from their homes and businesses between 1980 and 1985. Chemical accidents were reported in all of the 50 States. And even though the data base covers only one-half to one-third of the accidents which actually occurred during this period, the total quantity of extremely hazardous substances released exceeded 420 million pounds.

The United States Government through the Environmental Protection Agency is currently implementing modest programs to respond to this threat. EPA will be supporting local emergency planning and community right-to-know programs as authorized in the 1986 Superfund Amendments and Reauthorization Act. Emergency planning and community right-to-know are useful tools and may provide an initial information base for further action to reduce the potential for catastrophic events. However, accident prevention (as opposed to response planning) also has great promise, but is not given sufficient attention in current Federal programs.

Some European nations and American States have developed innovative and aggressive accident prevention and risk reduction programs that could serve as models for new, national efforts. New Jersey is implementing the Toxic Catastrophe Prevention Act which requires the development and implementation of site-specific risk reduction plans for each facility handling any one of 104 extremely hazardous substances. The European Economic Community has adopted the Seveso Directive setting up a comprehensive regime to identify and eliminate the potential for sudden, catastrophic releases of 178 substances.

However, no agency of the United States Government is actively engaged in efforts to prevent chemical accidents. Given the technical complexity and economic importance of modern industrial chemical utilization, it is appropriate that Federal agencies play a leading role in accident prevention and mitigation.

To reduce the likelihood of accidental releases of extremely hazardous substances, the reported legislation adds several new authorities to section 112 of the Clean Air Act which will: (1) establish a short list of extremely hazardous substances for priority attention; (2) require each facility handling such substances to prepare a hazard assessment; (3) create an independent chemical safety board to investigate accidents and recommend measures to reduce the risk of catastrophic events; (4) authorize the Environmental Protection Agency to issue rules to prevent, detect and correct accidental releases of extremely hazardous substances; (5) authorize the Agency to issue orders to correct specific situations which may endanger public health or the environment through release of an extremely hazardous substance; and (6) establish accident prevention and mitigation as a general duty of those who own and operate facilities handling extremely hazardous substances.

MUNICIPAL SOLID WASTE INCINERATORS

Municipal solid waste incineration facilities are becoming an attractive solid waste management option because they can reduce by 60–70 percent the volume of waste to be landfilled. With landfill capacity decreasing daily, the waste reduction aspects of incineration become increasingly appealing. A recent study by the Environmental Protection Agency indicated that 111 municipal incineration facilities are currently in operation in the United States, and that at least 210 more are in the planning or permitting phase. Studies by the Environmental Protection Agency and independent organizations have indicated cause for concern over the emissions of dioxins, a known carcinogen, and other pollutants into the ambient air. Citizen concern over potential health and environmental risks have made the permitting for municipal incineration units difficult or impossible in some communities.

The air pollutants which are of concern at incinerators can be grouped into the following subsets:

Organics.—The principal organic pollutants of concern are dioxins and furans because of their potency as toxics. Most of the cancer risk from incenerators is attributable to these two substances. It was originally thought that they were produced by combusting plastics. It now appears that they were formed from a variety of feedstocks, but formation can be prevented by very high combustion temperatures.

Metals.—The metals in flue gas may include lead, cadmium, arsenic, beryllium, zinc, chromium, nickel, antimony, and mercury. These metals come from inks, plastics, batteries, appliances and other sources. They are not destroyed by combuston. They may be vaporized which makes them more difficult to remove with pollution control devices. They may also be transformed into a new chemical matrix making them more available for leaching and human uptake.

Acid gases.—One acid gas of concern is hydrochloric acid (HCl). There is more chlorine in municipal waste than there is in other sources of fuel and incinerators can be the source of HCl emissions which do substantial materials damage in neighborhoods near an incinerator.

Particulates.—Ash, dust and smoke in the flue gas can cause visibility problems. It can also carry metals and organic compounds which are not completely combusted.

Oxides of Nitrogen.—Very high combustion temperatures, necessary for organic destruction, can contribute to the generation of nitrogen oxides. Nitrogen dioxide is a criteria pollutant and generally is an ozone and acid rain precursor.

Carbon monoxide.—Carbon monoxide (CO) is a criteria pollutant produced when the combustion process is incomplete.

The 111 incinerators currently in operation in the United States handle 45,000 tons of garbage per day, or about 4–5 percent of the municipal solid waste stream. The EPA reports indicates that of the 210 facilities which are in the process of being designed or permitted, 72 are in the advanced stage of construction. These facilities will increase the total capacity for incineration to 190,000 tons per day by 1990, which will be approximately 20 percent of the solid waste volume in that year.

Among the places with rapid growth projected are New York (where New York City has five very large facilities under construction—one for each borough of the city), Florida (where ground water vulnerability has practically precluded the construction of new landfills), and California.

Although many of these facilities will be owned and financed by local governments, they are generally constructed and operated by high-technology vendors, or which there are currently six or seven major firms. The Public Utilities Regulatory Policy Act has made a market for the energy that can be generated by incinerators, so-called cogenerators, and the electricity revenues are an important factor in accelerating the economics for these plants.

There are three types of incinerator technology. First, "mass burn" facilities take garbage untreated and burn it in a simple process to produce heat, steam and electricity. These facilities are large, are constructed on-site and are the dominant technology both now and in the future. They constitute 68 percent of the current municipal waste incinerator capacity.

RDF is the acronym for "refuse-derived fuel", the second major technology. RDF involves centralized separation and treatment of the solid waste before it is burned. The waste is processed to remove non-conbustibles and is shredded or pelletized so that it can be fed to specialized boilers. Some RDF is cofired with coal at electric powerplants, but most is burned at 100 percent RDF-dedicated boilers. There are 10 RDF facilities on-line across the country which comprises 23 percent of the current municipal waste incinerator capacity.

"Modular" is the name for the third technology. These are usually small, prefabricated units which burn the waste in a two-chamber process. Although there are 56 modular units currently in operation, they account for only 9 percent of the industry capacity because each plant is relatively small.

Given the rapidly increasing number of solid waste incinerators being planned and constructed, we face a situation where, without legislation, whatever environmental or health problems incineration might cause would quickly be "built-in" to these hundreds of units about to come online across the country. This legislation provides a regulatory program to control both the emission of pollutants into the ambient air and the management and disposal of the ash residue from municipal waste incineration facilities. It is necessary to regulate air emissions and ash simultaneously because the control technologies required to limit emissions trap pollutants, which then become part of the fly ash.

Lead and other heavy metals and non-combustible pollutants are also concentrated in the bottom ash, the residue remaining after incineration. In practice, fly ash and bottom ash are frequently mixed together as combined ash. Tests performed by EPA and independent organizations on incinerator ash have demonstrated that ash frequently exhibits hazardous characteristics. The varied nature of the waste stream being incinerated creates different test results from one test to the next within the same facility. Under current law, ash which does not fail a toxicity test can be disposed of in a subtitle D landfill, while ash that fails must be disposed of in a subtitle C landfill. Not being able to predict its non-hazardous nature over time makes it difficult for operators to make plans for ash disposal. This legislation provides a regulatory program for the management, handling, storage, transportation, reuse, recycling, and disposal of all ash from municipal solid waste incineration facilities.

By controlling both the air emissions and the ash residues, the legislation provides assurance that municipal solid waste incineration will be a solid waste management option which adequately protects human health and the environment.

ALTERNATIVE FUELS

The bill contains several new provisions regarding development and use of alternative fuels and alternative fueled vehicles. The emission benefits of increased use of alternative fuels are extensively documented in the hearing record. Most of the major auto manufacturers continue their research and development of alternative fueled vehicles. A number of energy companies recently announced plans to produce and distribute commercial quantities of methanol to meet the needs of the growing number of methanol vehicles in California. Several nonattainment areas are in the process of implementing comprehensive alternative fuel programs in an effort to reach attainment.

While the Committee is heartened by these developments, the timely and broad-based development of alternative fuel sources, distribution networks and vehicles requires additional emphasis. The dilemma preventing increased use of alternative fuels has been characterized as a "chicken and egg" problem—consumers will want both a dependable sources of alternative fuels and alternative fuel vehicles at competitive prices while auto manufacturers will be wary of producing alternative fuel vehicles without assurance that demand for such vehicles exists.

The alternative fuel provisions in this bill will assist in solving this problem. The bill requires centrally fueled vehicle fleets of fifty or more to use alternative fuels. In addition, provisions requiring an increase in the oxygen level of gasoline has been included. A special provision concerning the volatility of alcohol fuels should encourage greater use of these fuels. These measures will increase our experience with alternative fuels and vehicles while augmenting our understanding of the air emission consequences of these emerging fuel sources.

DISCUSSION OF INTENT

TITLE I—REQUIREMENT FOR NONATTAINMENT AREAS

Extension Conditions

SUMMARY

This section amends part D of the Act to establish conditions for extending deadlines for attainment for ozone and carbon monoxide beyond the dates in existing law.

New section 172(a)(3) provides that an area that has made a good faith effort to attain a standard may receive a 5-year extension of the attainment deadline, that is, an extension to December 31, 1992, so long as the State submits a revised State implementation plan (SIP) that meets existing and new provisions of section 172. New section 172(e) permits areas agreeing to more stringent conditions, including those ozone nonattainment areas that exceed the standard by between 50 and 125 percent, to extend their attainment deadlines to as late as December 31, 1997, and ozone nonattainment areas that exceed the standard by more than 125 percent to extend their deadline to as late as December 31, 2002.

New section 172(c)(2) provides that not later than 3 months after the date of enactment, a State must submit a commitment in writing signed by the Governor and the principal elected official of each local government or air pollution control agency that the state will submit a revised implementation plan in accordance with requirements of the Act. Not later than December 31, 1989, a SIP must be submitted for all areas seeking an extension. The SIPs must provide for attainment of a standard by an applicable deadline and address maintenance for 20 years after such attainment.

New section 172(d) requires that areas seeking 5 year extensions implement the following requirements: (1) an enhanced vehicle emissions control inspection and maintenance (I/M) program which is defined in the bill; (2) controls of hydrocarbon emissions from vehicle refueling (Stage II vapor recovery) in ozone nonattainment areas required to have I/M programs; (3) a schedule for implementing use of alternative fuels by centrally fueled fleets of 50 or more vehicles; (4) implementation of reasonably available control technology (RACT) on existing sources of hydrocarbons (HC) and oxides of nitrogen (NO_x); (5) a prohibition on achieving credit for required emission reductions at existing sources by reducing emissions at other sources ("bubbling" prohibition); (6) a requirement for controls that achieve lowest achievable emissions rates (LAER) on new sources: (7) adoption of reasonably available control technology for categories of sources identified by a regional commission under new section 178; (8) the adoption of contingency measures, to be implemented in the event of a waiver or delay under new section 176(e), that apply all control requirements applicable to major stationary sources to any source in the area emitting 10 tons or more per year of a pollutant or precursors of a pollutant for which an area is in nonattainment, and (9) such other measures as may be necessary to attain a standard not later than December 31, 1992.

Enhanced I/M programs and Stage II vapor recovery must be in operation not later than December 31, 1989, in areas where such requirements currently apply as part of an approved or submitted SIP, and, in other cases, not later than December 31, 1990.

New section 172(d)(2) provides that for an area not part of an ozone transport region under section 178, in which the fourth highest daily maximum one-hour average concentration of ozone during the most recent three years for which there is adequate information does not exceed 0.14 parts per million, the state may submit, not later than December 31, 1988, an implementation plan that meets requirements of existing section 172(b) and that requires implementation of one or more but not necessarily all of the following; and enhanced I/M program, Stage II vapor recovery, or a schedule for use of alternative fuels for centrally fueled fleets of 50 vehicles or more. The other requirements of section 172(d)(1) apply in such an area. In order to submit such a plan the state must demonstrate to the satisfaction of the Administrator that the remaining requirements of the SIP (together with implementation of the provisions of title II, section 130, and other provisions of the Act) will result in attainment of the national primary ambient air quality standard no later than December 31, 1990.

New section 172(e)(1)(C) permits Rhode Island to demonstrate to the satisfaction of the Administrator and the commission of the transport region of which Rhode Island is a part, that section 172(d) control measures, together with controls required throughout the transport region, will be sufficient to bring the State into compliance with a standard no later than the date the State would have attained the standard if it complied with application additional requirements of new section 172(e)(2).

Areas eligible for and seeking an attainment date extension beyond December 31, 1992, must adopt the requirements applicable to 5-year areas. In addition, new section 172(e)(2) imposes the following requirements in such areas:

1. Subparagraph (A) requires areas to identify and adopt specific enforceable strategies and transportation control measures to

attain reductions in mobile source emissions and to offset any growth in vehicle miles traveled (or to offset any increases in emissions associated with that growth). The bill specfies measures that must be considered by the State, along with any others needed to attain the necessary emission reductions and growth offset. These specified measures must ordinarily be adopted by a State for a 10- or 15-year area. If the State fails to include any listed measure in its implementation plan, the plan must contain specific alternative emission reduction measures yielding a quantitatively comparable reduction in emissions, and an explanation of why the listed measure was not adopted. The measures listed in paragraph (A) are:

(1) programs for improved public transit;

(2) requirements for the conversion of fleet vehicles to cleaner engines, or fuels, or to otherwise control fleet vehicle operations, and to control growth in the numbers of vehicles-for-hire and to reduce the number of vehicle miles traveled by such vehicles in areas of high emission concentration;

(3) limitation of certain roads or lanes to common carriers or to high occupancy vehicles;

(4) requirements for major employer participation in programs to encourage use of public transit and multiple occupancy vehicles, and in programs providing alternative work hours (including staggered hours and the compressed work week);

(5) traffic flow improvements;

(6) programs for areawide ridesharing; and

(7) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use.

2. Subparagraph (B) requires reductions from 1987 levels of emissions of hydrocarbons and oxides of nitrogen, for areas failing to attain the ozone standard, and of cabon monoxide (CO) for areas failing to meet the CO standard, equal to 33 percent by the end of 1991, 50 percent by the end of 1994, and 65 percent by the end of 1997. If area does not need the specified level of reductions in order to attain a standard by its deadline, it may substitute the percentage reductions that are necessary. In no event may a substituted reduction result in a total that is less than 5 percent of the remaining emission inventory for each year after 1987 and prior to attaining the standard.

3. Subparagraph (C) requires each major stationary source in a nonattainment area to reduce emissions of pollutants that contribute to nonattainment by the same percentage required of the entire area, with credit given for certain emission reductions achieved by a source during or after 1982.

4. Subparagraph (D) requires stationary sources in nonattainment areas subject to RACT or other emissions reduction requirements to pay a $100 per ton fee for emissions of oxides of nitrogen, hydrocarbons, and carbon monoxide.

5. Subparagraph (E) requires sources that do not meet the individual source reduction requirements under subparagraph (C) to pay an excess emissions penalty equal to the economic value of noncompliance but in no event less than $5,000 per ton of emissions. Fees and penalties collected under subparagraphs (D) and (E) are to be retained by the air pollution control agency or other

entity collecting the fees and excess emissions penalties and are to be used for air pollution control, including air quality-related improvements to public transit. If the Administrator is implementing a program in an area, fees and penalties will be deposited in a special federal fund to be available to carry out activities under the Act.

The bill also amends section 173 to require a source that intends to locate in a nonattainment area that does not plan to meet an ambient air quality standard by December 31, 1992, where emissions from the source will contribute to the pollutant for which the area is in nonattainment, to obtain offsets from existing sources in the area equal to twice the emissions from the new source.

DISCUSSION

This section allows existing nonattainment areas for ozone and CO to receive extensions of deadlines to specific future dates that will vary, depending on the severity of the pollution problem in an area.

In order to receive extensions beyond those applicable under existing law, a State must, within 3 months of enactment, submit to the Environmental Protection Agency a commitment in writing, signed by the Governor and local elected officials responsible for implementation of a SIP, that a revised SIP will be submitted. By December 31, 1989, the State must submit a revised SIP that complies with the Act, as amended by the bill.

The requirements to be included in the SIP will depend on the deadline an area determines is the earliest date by which it can attain a standard. That date will be the new attainment deadline applicable to the area.

The SIP's of all areas are required to meet the requirements of existing section 172(b) of the law, as well as all requirements (with an exception discussed below) added by new section 172(d). The requirements are as follows:

(1) Operation of an enhanced I/M program;

(2) Implementation of Stage II vapor recovery systems in ozone nonattainment areas;

(3) A schedule for implementing use of alternative fuels or power sources by centrally fueled fleets of 50 or more vehicles;

(4) Implementation of reasonably available control technology (RACT) (as defined in new section 171(6) and described in the Report under section 102) on existing sources of hydrocarbons (HC) and oxides of nitrogen (NO_x);

(5) A prohibition on achieving credit for required emission reductions at existing sources by reducing emissions at other sources ("bubbling" prohibition);

(6) A requirement for controls that achieve lowest achievable emissions rates (LAER) (a modified definition of which is provided in the bill and is discussed under section 102 of the Report) on new sources;

(7) Adoption of reasonable available control technology for categories of sources identified by a regional commission under new section 178;

(8) The adoption of contingency measures, to be implemented in the event of a waiver or delay under new section 176(e), that require application of all control requirements applicable to major stationary sources to any source in the area emitting ten tons or more per year of a pollutant or precursors of a pollutant for which an area is in nonattainment, and

(9) Such other measures as may be necessary to attain a standard not later than December 31, 1992.

Areas not in an ozone transport region and that are close to attaining the ozone standard, that is, areas in which the fourth highest daily maximum one-hour average concentration of ozone during the most recent three years for which data is available does not exceed 0.14 parts per million (ppm) may not be required to meet each of the requirements in (1), (2) and (3) above. If the State submits its SIP by December 31, 1988 (that is, one year earlier than otherwise required), and can show that only one or two of the first three requirements, together with the other requirements in section 172(d) and requirements in other provisions of the Act applicable to the area, will bring the area into attainment no later than December 31, 1990 (that is two years earlier than otherwise required), such an area will not be required to implement all of the first three requirements, only those needed to attain the standard by its deadline.

Length of extension.—States must carefully and realistically assess the time needed to bring non-attainment areas into compliance with the standard, using the most aggressive emission reductions strategies that can be implemented within a given time. The advantage to an area that determines it can achieve the standard no later than December 31, 1992, is that it will not be required, by Federal law, to adopt additional measures required of all areas with attainment deadlines later than that date. These additional requirements include specific transportation control measures; specific, periodic percentage reductions in both areawide and individual stationary source emissions; and emission fees and penalties imposed on stationary sources in the area.

The disadvantage, on the other hand, for an area that selects an unrealistically early date in order to avoid having to implement the additional measures listed above, is that if it misses the deadline, it will be subject to a construction moratorium and to a cutoff of Federal highway funds, other than those for safety or air quality-related projects.

The bill contains certain presumptions about the ability of an area to meet the ozone standard, based on the most recent estimates of the ozone concentrations in that area. Where the primary standard for an ozone is exceeded by between 50 and 125 percent, the area is presumed to be unable to meet the December 31, 1992 deadline. The State may overcome the presumption and demonstrate that the area can meet the deadline, but the demonstration must be technically sound. Past experience with demonstrations of dates by which standards will be attained shows that errors in projections have consistently been overly optimistic, that is, projecting attainment before it can actually be achieved.

Areas that exceed the ozone standard by less than 50 percent may nonetheless conclude that—even with implementation, of all available measures—it cannot attain the standard by December 31, 1992, and choose to implement the additional measures required of areas seeking extensions beyond that date.

The bill makes special provision for Rhode Island which, because if its size and location downwind from major sources of ozone precursors in other States, is singularly ill-equipped to control major contributors to its ozone problem. Because of transport, the State may not be able to attain the ozone standard within five years. Thus, without special provisions, the State would most likely have to implement all the additional requirements applicable to areas that cannot meet the December 31, 1992, deadline.

Because some of the more stringent requirements applicable to areas needing more than 5-year extensions may be inappropriate or unnecessary to bring Rhode Island into attainment, the bill provides the State an opportunity to show that this is the case. The burden is on the State to make an adequate case to the Administrator, and if it does, it may be relieved of adopting those requirements. The provision does not provide a blanket exemption for this State or any other area; such an approach is unacceptable.

All areas that exceed the ozone standard by 125 percent or less must attain the standard no later than December 31, 1997.

Areas that exceed the ozone standard by more than 125 percent may submit plans showing attainment by December 31, 2002. Such an area may also submit a plan that does not demonstrate attainment by that date but only if certain stringent, long-term emission reduction measures are included in the plan. These measures are as follows: (1) provisions to assure that, by December 31, 1997 passenger vehicle occupancy on highways in the area will exceed 1.5 persons per vehicle through all periods of the day; (2) requirements effective no later than December 31, 1997, stating that emission standards for engines in stationary or non-vehicular use and for off-road vehicles be as stringent as standards for light-duty motor vehicles; (3) provisions to assure that by December 31, 1997, at least 15 percent and by December 31, 2002, at least 40 percent, of all registered motor vehicles have been converted to alternative fuels or power sources with lower emission characteristics; and (4) provisions requiring that by December 31, 1990, emissions from new and existing commercial and residential sources generating one ton or more of a pollutant for which the area is in nonattainment are regulated and reduced to the maximum extent practicable. While such an area may submit a plan that does not demonstrate attainment, the area is still subject to the attainment deadline of 2002 and the sanctions for failure to attain.

The level of specificity in several provisions in this section of the bill is intended to assure that emissions reductions are actually achieved, not just anticipated. There follows an explanation of several specific provisions and the benefits this implementation will achieve.

Enhanced I/M programs.—As a condition for receiving an extension of attainment deadlines for ozone and carbon monoxide beyond 1982, the 1977 Clean Air Act Amendments required areas to implement inspection and maintenance programs for motor vehicles. As required by current EPA regulations, I/M programs must test light-duty vehicles for emissions of hydrocarbons in ozone nonattainment areas and for emissions of carbon monoxide in CO nonattainment areas, where the areas contain a population of 200,000 or more.

At the present time there are 60 I/M programs operating in 32 States. These programs vary widely in design and in their effectiveness in reducing emissions from vehicles. Some programs provide for inspections at a small number of centralized stations in the urbanized area; some provide for decentralized inspections at service stations or other facilities and require use of sophisticated computerized analyzers; and some provide for decentralized inspections with less effective manual analyzers or with devices that allow operators to terminate testing without creating a record of failure. Some programs exempt more vehicles than others from inspection requirements because of age, type or owner residence. Some programs inspect for evidence of tampering with the emission control system or for misfueling, while others do not. A few programs require inspections once every two years, while the majority require annual inspections. Finally, areas vary widely in the level of repair cost waivers, that is, the maximum cost that a car owner will be required to incur to bring a vehicle's emissions into compliance.

Motor vehicles of all types are major sources of the pollutants that form ozone, and are the primary sources of carbon monoxide. Because the number of vehicle miles traveled is expected to continue to grow, emissions from vehicles will increase, more than offsetting the expected reductions resulting from replacement of older vehicles by newer, cleaner ones by the mid-1990's and growing steadily after that. One of the ways to help slow that long-term growth and to reduce emissions in the short-term is to improve the operation of I/M programs and to increase the number and size of areas for which I/M programs are required.

I/M programs are known to be extremely cost-effective means of controlling mobile source emissions. In addition, in at least one jurisdiction, the I/M program produces millions of dollars of revenue to the State, beyond program costs, each year.

EPA estimates that an enhanced I/M program similar to the one required by the bill will achieve reductions in hydrocarbon emissions from vehicles about 35 percent greater than levels being achieved by the median of the programs currently operating and about 150 percent greater than the least stringent existing programs. For carbon monoxide the reductions would be approximately 20 percent greater than the median and 180 percent greater than the least stringent. The Agency also estimates that enhanced I/M will achieve a 2 to 4 percent reduction in the hydrocarbon emission inventory over that achieved by existing programs and a greater reduction for CO, at least in the short-term.

In order to reduce vehicle emissions, the bill (in amendments adding new provisions to section 172 and a new paragraph (7) to section 171) directs that inspection and maintenance programs must be implemented in all urbanized areas that exceed 100,000 in population (based on the 1985 census) and that exceed either the ozone or carbon monoxide standard after December 31, 1987. The bill also contains several specific requirements for inspection and maintenance programs.

First, the bill specifies that all I/M programs are to test for emissions of HC, CO, NO_x, and diesel particulates, and that all vehicles, not just passenger cars of a certain type, must be inspected. Oxides of nitrogen have been added to the pollutants to be tested because of their rule in ozone formation, as well as their contribution to acid deposition and possible direct health effects. Diesel particulates are included because of their adverse effects on health and the contribution they make to impaired visibility, soiling and other adverse environmental effects.

Opacity tests for heavy-duty vehicles that are required by new section 171(7)(E) are intended to address the primarily urban problem of smoke emissions from diesel buses and trucks. This reference to diesel bus and truck exhaust is not intended immediately to require extensive new testing protocols. The Agency should be developing heavy-duty vehicle inspection procedures for particulates and other emission parameters, to be implemented in the early 1990's. But the current standards for such exhaust include simple opacity standards, and while they are generally met by new buses and trucks, inadequate maintenance can cause such emissions to worsen dramatically.

The provision is intended to require regular and frequent measurement of the opacity of heavy-duty engine exhaust of in-use vehicles. Such testing should include measurements under load, and such simple testing may be accomplished without the need for the construction of any significant facilities whatsoever.

Portable devices that measure emissions on the road without need for dynamometers or similar devices may be acceptable. In the event that in-use vehicles significantly exceed the existing standards, the offending vehicles must be serviced as necessary. As required by section 171(7)(D), inspection for heavy duty vehicles must also include an anti-tampering checks, with appropriate repair requirements.

How and at what locations such inspections of heavy-duty vehicles would take place would be determined in the State implementation plan, in accordance with EPA guidance (such guidance to be available in a timely manner). It may be appropriate, for example, to test diesel buses belonging to a transit authority at a garage or terminal of that authority, while dump trucks and trash trucks may need to be inspected at other centralized locations. Such guidance should advise States on how to test for opacity in a technically feasible manner.

All areas that are required to have I/M program must conduct annual inspections, and all inspections are required to include tests for tampering and misfueling and to require repairs where these activities are detected. The letter requirements are included because of their effectiveness in reducing the prohibited activities. For example, EPA has found that in areas without I/M programs, 14 percent of all passenger vehicles have been subjected to fuel switching; this figure drops to 10 percent with an I/M program and to 6 percent with I/M and anti-tampering checks. Anti-tampering inspections can be effectively accomplished by a physical inspection of the engine and exhaust system by trained personnel.

Because decentralized inspection programs that require use of only manual analyzers have been found by EPA to be the least effective program, to be subject to abuse and error, and to make enforcement difficult, the bill requires that areas with decentralized programs must conduct emissions tests using sealed, computerized analyzers which greatly reduce the problems associated with decentralized testing. Strict accounting and audit controls will still be necessary to assure maximum emission reductions.

A repair cost waiver limit of $200 is applied to all areas to assure that the vast majority of defective emission control systems identified during an inspection are corrected. The waiver limitation does not apply in areas where waivers are allowed only for costs not covered by a warranty under section 207.

Stage II vapor recovery systems.—The bill requires that all areas that fail to meet the ozone standard by December 31, 1987, with the possible exception of areas that can meet the standard by December 31, 1990, must require Stage II vapor recovery systems at service stations throughout the area. Based on information supplied by EPA, 17 of 37 areas likely to request an extension beyond December 31, 1990, are currently committed to Stage II vapor recovery in their SIPs.

State II vapor recovery is a system of dual hoses installed in service stations to capture hydrocarbon emissions during vehicle fueling. The 1977 amendments to the Clean Air Act required the Administrator to determine whether to require technology on motor vechicles ("onboard" technology) to control refueling emissions, rather than Stage II systems. To date, the Agency has not made a final determination, although it published a proposal, on August 19, 1987, to require canisters on vehicles, beginning at least 2 years after promulgation. This could not be prior to 1992. In the preamble to the proposed regulation the Agency noted that "both onboard and Stage II are cost effective approaches" and that Stage II "has a potential advantage in terms of total cost . . . It also has the potential for implementation in the shortest overall 'lead time'."

While both onboard and Stage II are designed to capture refueling emissions, there are significant and relevant differences between the two technologies. The need for both Stage II and onboard canisters has increased due to the protracted delay by the Agency in developing regulations to control emissions from refueling. Had the Agency promulgated refueling regulations during the last ten years, it is possible that implementation of the refueling requirements would have substantially mitigated the need for requiring both technologies. Both Stage II and onboard are designed to capture emissions from refueling of mobile sources. They capture emissions of benzene, a known carcinogen, and other toxic pollutants. Stage II controls refueling emissions from all vehicles using the equipment, while only emissions from the refueling of vehicles manufactured after the effective date of a regulation would be controlled under an onboard approach. Because full fleet turnover takes an estimated 10-12 years, benefits from onboard technology will not be fully realized for 14-16 years.

While EPA estimates that implementation of Stage II will take at least three years and, perhaps, as long as seven (the time suggested as appropriate by the American Petroleum Institute), the State of Missouri, which has adopted requirements for installation of Stage II equipment in the St. Louis area, anticipates full implementation in 20 months.

The effectiveness of Stage II systems in reducing hydrocarbon emissions is not in dispute. EPA estimates that Stage II will reduce hydrocarbon emissions in the areas in which it is employed by approximately two percent. In the context of other measures available to control hydrocarbon emissions in nonattainment areas, this is a significant amount. Missouri estimates that hydrocarbon emissions in the St. Louis area will be reduced by over 4,000 tons per year and testified that they adopted the controls because they offered "the greatest percentage of reductions at the lowest cost" compared to other control options. It is estimated that implementation of Stage II controls in nonattainment areas in Maryland would achieve the reductions needed (7 tons per day) to bring these areas into attainment.

Cost estimates of Stage II vary. Missouri's experience shows compliance costs of $650–$700 per ton. The highest estimate, $2,600 per ton, is that of the Service Station Dealers of America. EPA, OTA, and the California Air Resources Board (CARB) estimate the cost to be approximately $1,000 per ton of hydrocarbons removed. In comparison, CARB estimates that the future average costs of stationary controls for hydrocarbons will range from $2,000 to over $5,000 per ton.

Inconvenience and the difficulty of using Stage II equipment have been cited by some as major implementation problems, but the experience in California, which has required Stage II system in some areas for several years and which recently extended the requirement throughout the State, suggests that such problems are minimal. A 1984 study conducted by Sierra Research, Inc. of California's Stage II system reported the following findings:

> As the emissions control performance of Stage II systems has improved, so has customer acceptance of the systems. California regulations require the posting of toll-free telephone numbers at service stations equipped with Stage II system. Motorists are encouraged to report any problems they are having with the systems. While 1st generation systems generated numerous complaints, the level of complaints had dropped to one per 200,000 refuelings by 1982.
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> Based on hundreds of interviews the authors have conducted, the average user of self serve gasoline stations would prefer to use conventional nozzles. However, most motorists consider the difference between conventional and Stage II nozzles to be totally acceptable, especially if they are aware of the fact that the Stage II nozzles reduce air pollution. Many motorists actually prefer the Stage II systems because they substantially reduce gasoline odors and prevent gasoline spitback from the fillpipe.

A well-implemented Stage II program using equipment designed to avoid potential handling difficulties is less likely to provoke complaints than poorly implemented and monitored Stage II programs.

Centrally-fueled fleet requirements.—The bill requires all nonattainment areas to develop a schedule to assure that centrally fueled fleets of 50 vehicles or more use alternative fuels or power sources with lower emission characteristics for pollutants which contribute to the area's nonattainment status. There may currently be limits on the availability of vehicles and fuel supply systems to accomplish this end. Schedules are to be as aggressive as is possible consistent with these constraints. This provision is intended to enhance the availability of such vehicles and such fuels. In developing a schedule, the State should consider the date by which the area is required to come into attainment, and how much fleet use of alternative fuels can contribute to that objective.

It is not the expectation that vehicles routinely used in transportation between metropolitan areas will be affected. Leased vehicles that are operated as if they were not commonly owned (such as vehicles leased by individuals for personal or business use) are not intended to be included. Similar leased vehicles operated as part of larger fleets may be included if the overall size of the fleet operation meets the size threshold. Centrally fueled fleets are included, as well as those not currently centrally fueled for which a central fueling facility is provided under the implementation plan.

While schedules under this provision should be crafted to avoid placing unreasonable burdens on large, multi-fleet operators, symbolic or administrative divisions of large fleets into small ones cannot be used to avoid the requirements of this paragraph. The Administrator is to provide guidance to the States to aid in implementation of this provision, specifying the amount of emission reduction credit that a State may include in a State implementation plan for various types and schedules of fleet use of alternative fuels.

Eligible fuels or power sources with lower emissions characteristics include, but are not limited to methanol, ethanol, compressed natural gas, electric vehicles, or other sources—so long as they produce reduced levels of emissions.

The conversion of fleets to alternative fuels is contingent upon fleet operators obtaining an adequate reliable long-term source of fuel as well as sufficient replacement vehicle components. Therefore it is not expected that major emission reductions can be achieved by fleet vehicle conversion by the December 31, 1990 date in this provision.

Prohibition on "bubbling".—Many existing sources in nonattainment areas are required to meet emission limitations specified in State implementation plans or other regulations issued under the Act. In some instances, rather than meet a limitation, an existing source procures emission reductions from other sources in the area, either within the same facility or at another location, and counts those reductions against its own requirements. This practice is known as "bubbling", because emissions from an entire facility or from a larger area are treated as if they are under a large dome or "bubble". So long as the total emissions within the bubble equal no more than the sum of the emission limits of the individual sources, emissions from individual sources can be increased or decreased from required levels.

Proponents of bubbling argue that the practice achieves required emissions reductions at the lowest cost and that it encourages innovation because industry knows that if it finds a less expensive way to reduce emissions at one source, it can avoid more costly reductions at another source. The arguments are appealing, but experience has shown that bubbling most often results in smaller if any pollution reductions than a system that requires that each and every source meet its emission limits.

In practice, allowing bubbling gives an additional incentive to regulated industries to seek the least stringent emission limits possible for an existing source or class of sources. To the extent that a particular source can easily achieve greater reductions than required by a lax emission limit, controls can be minimized or avoided altogether at another source.

Other abuses of emissions trading have also occurred. For example, the Committee heard instances of credit being for "emission reductions" associated with plant closings years earlier; of instances where missions from the same unit were reported up to 172 times greater when seeking credits to avoid reductions on other units than when reported to enforcement authorities; and of cases where industries were allowed to treat the differences between their actual emissions and the maximum possible under their permit as an entitlement available to avoid mandated controls on other units or allow increased emissions.

It should also be noted that bubbling is not the only incentive for innovation; finding cheaper or more effective means of meeting emission limits under a source-by-source control approach will also benefit an industry, and in fact, having to meet tough standards at every source may well increase a facility owner's incentive to look for innovations across a wider spectrum of operations.

Thus, while in theory bubbling is attractive as a means of obtaining emission reductions at lower costs, experience shows that lower costs are achieved at a price of more pollution. The prudent course is to prohibit bubbling in areas that must achieve additional reductions above those already required in order to meet health-based air quality standards. The bill prohibits bubbling in these nonattainment areas.

Enforceable strategies and transportation control measures.—Transportation control measures have been required by the Clean Air Act since 1970; identified in section 110 as a tool to be used when necessary to attain ambient standards in a particular area. New vehicle emission standards, together with inspection and maintenance programs, surveillance and recall and other strategies to encourage continued compliance with emission standards in use, play a major role in attaining ambient air quality standards. More must be done to reduce the contribution of mobile sources, however, and particularly in areas experiencing growth in population, vehicle registration, or vehicle travel. The nonattainment areas that cannot meet ambient standards for ozone or carbon monoxide within an additional five years must energetically implement transportation control measures to attain and maintain those standards. This is especially the case for carbon monoxide, since it is almost exclusively a mobile source pollutant and no control options other than transportation control measures are available beyond vehicle emission standards and inspection and maintenance programs.

Transportation control measures have been among the most difficult requirements of the Act for States and localities to develop and impose. Such measures may require a significant restructuring of transportation patterns and systems for a community, or other major adjustments. Often transportation agencies have not been cooperative. Business communities and major employers have been resistant. This provision requires so-called 10- and 15-year areas, particularly those projecting growth in vehicles or vehicle travel, to adopt specific transportation control measures or find equivalent emission reduction measures.

Most transportation control measures involve either reductions in the use of private automobiles or changes in traffic flow or the congregation of vehicles to reduce emission concentrations. There must be shared responsibility among many governmental entities to develop and implement such measures. All these governmental entities must work together, involving public and business interests as well, to assure effective implementation of transportation control measures. Part D of the Clean Air Act already requires implementation plans to include evidence that the public and appropriate State and local agencies have been involved in the selection of measures, and that governmental agencies have adopted legally enforceable requirements and schedules to implement such measures. New section 172(e)(2)(F) specifically requires a legally enforceable commitment by the State transportation agency and all local public transit and transportation agencies to implement section 174(b) and sections 176 (c) and (d).

This means that strategies and control measures adopted in the revised implementation plan must be based on and included in the continuing, comprehensive, and cooperative planning process required under section 134 of title 23, United States Code, and the Urban Mass Transportation Act. This "3-C" process encompasses the various viewpoints and responsibilities of key public stakeholders in transportation, involving all modes of surface transportation and ancillary facilities, regional, State and local authorities, and private sector representatives with the objective of equitably distributing compliance responsibilities on a regional basis.

New section 172(e)(2)(F), together with the provisions of subparagraph (A) and section 176(c), also means that no metropolitan planning organization or other transportation agency may approve a project that does not conform to a revised implementation plan, including the transportation controls required by subparagraph (A).

Under new section 172(e)(2)(A)(vii), programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use, include road user charges, tolls, parking surcharges or other pricing mechanisms, vehicle restricted zones, vehicle restricted period, registration conditions or other devices.

In many areas, improved public transit will be an essential part of transportation control measures. Often such improvements in transit capacity, service, or attractiveness are necessary to make the more restrictive transportation control measures fully effective. Programs for improved public transit include capital expenditures, operating improvements, and marketing plans. This will require increased funding, or a reordering of priorities, from Federal, State, and local resources. The fees and excess emission penalties retained by air pollution control agencies under new section 172(e)(3)(B) can be used to fund improvements to public transit related to air quality, particularly projects identified under paragraph (2)(A).

Improved public transit can be one way of meeting section 172(e)(2)(A)'s requirement that the State seek to assure adequate commuter access to downtown measures. Measures adopted under clause (vii) to limit or restrict vehicle use in areas of emission concentration, such as congestion pricing, tolls, parking restrictions, or vehicle restricted zones or periods, should not cause a relocation of employment or commercial activities. The State is also to avoid measures that merely relocate emission concentrations to the other areas such as non-monitored intersections or shopping, residential or employment centers in suburbs or other parts of the city.

Vehicle restrictions and public transit improvements must also be managed to avoid further barriers to disabled drivers. Individuals with handicapped license plates or placards could be exempted from parking surcharges, tolls, road user charges, or other vehicle restrictions. Mass transit and ridesharing should be provided that is accessible to the handicapped. This will allow disabled individuals who now rely on private vehicles to utilize mass transit.

A number of communities have adopted or are seriously considering innovative transportation control measures that may be among those other communities will be required to consider under new section 172(e)(2)(A). Examples of these include requirements that employers of 100 or more workers provide incentives (such as preferential parking, van operation subsidies, free bus passes, or even cash bonuses) for commuting via ridesharing or public transit; time-of-day restrictions for trucks or other vehicles in congested areas; and trip reduction ordinances. Such ordinances have been developed in recent years by transportation planners battling traffic congestion with its attendant delays and frustrations. The basic strategy of such ordinances, reducing separate trips, has a similar air quality benefit to directly reducing vehicle miles traveled. Such ordinances should be considered as part of air quality management planning, to deal with anticipated growth, as air quality objectives are integrated with all transportation planning.

Each non-attainment area will have unique problems and therefore may require unique regulatory solutions. In many areas only programs that review new, large commercial, residential and industrial development in advance of permitting or other permit-like prior approvals will provide the necessary regulatory framework to assure that such developments do not cause increases in vehicle miles traveled or local emission concentrations so as to either exacerbate existing air pollution problems or negate the benefits of other regulatory measures required by or adopted pursuant to this Act. An implementation plan might otherwise, for example, require increased bridge or tunnel tolls as a disincentive to vehicle use while at the same time failing to address new major projects which attract significant additional vehicles. The implementation plan should identify specifically the relationship between such disincentives to vehicle use and actions that may indirectly encourage vehicle use.

Where measures specified in subparagraph (A) are not adopted, the plan must provide equivalent measures. Programs to review and restrict the growth of sources which indirectly increase emissions and traffic may be required as equivalent measures.

Enforceable strategies and transportation control measures under new section 172(e)(2)(A) are mandatory requirements and as such are not affectd by any conditions or limitation on the Administrator's authority set forth in section 110.

Emissions fees.—The bill provides that each stationary source subject to reasonably available control technology or other emission reduction requirements must adopt and enforce an emissions fee of not less than $100 per ton of hydrocarbons, oxides of nitrogren, or carbon monoxide. The fee is substantially less than some of the fees currently in use in Southern California, which assesses $241 per ton for hydrocarbons, and $139 per ton for oxides of nitrogen.

The fee is intended primarily to improve the quality of emissions inventories. Where this fee is in use, it has shown a significant improvements in the quality of such inventories. Revenue generated by the fee, to be retained by the air pollution control agency (or the EPA if it implements a Federal implementation plan), is to be used by the air pollution control agency for additional modeling, enforcement, or other air pollution control-related activities. It is not intended to replace other regulatory requirements or other funding sources.

Excess emissions penalty.—As a companion to the transportation control measures and stationary source controls required by the bill, the bill would also require metropolitan areas that will not be able to attain health standards within the next 5 years to adopt an excess emissions penalty of a minimum of $5,000 per ton of excess emissions.

The excess emissions penalty is intended to provide an important new incentive for pollution sources to reduce emissions. Because it falls on excess emissions, the penalty will create strong incentives for stationary sources to achieve the emission reductions called for in the bill's emissions reduction schedules. In each of the covered metropolitan areas, the bill establishes a schedule of reductions which must be met by each source over time until the health standards are achieved. Since the penalty relates only to emissions from each source that exceeds the limits established by these schedules, a source can escape the penalty by meeting the emissions reduction schedule established under the bill. But since exceeding the emission limits will now carry a monetary penalty, there will be additional incentives to control emissions to the levels needed to attain standards.

The bill provides that an excess emissions penalty must be at least $5,000 per ton of excess emission. Each nonattainment area will determine whether a higher figure is appropriate, based on the factors listed—the economic cost per ton of pollutant removed which the source would have expended to attain the mandated emission reductions, or the economic value to the source of delaying compliance with the emission reduction requirement, whichever is greater. Some nonattainment areas have already concluded that health standards cannot be attained without adoption of measures with economic costs of $15,000 per ton of pollutant removed or more. The excess emission penalty must accurately reflect such costs. Areas with the most serious air pollution problems are the ones where the largest incentive for pollution controls are necessary and therefore where excess emissions must be most heavily penalized.

Two-for-one offsets.—Current law requires a new source planning to locate in a nonattainment area to obtain reductions in emissions from existing sources in the area that offset, on a greater than one-for-one basis, emissions from the proposed source. EPA currently requires that new sources offset their emissions on a 1.2-to-one basis.

Ambient air quality in some areas of the nation is sufficiently poor that attainment of healthy air quality levels is not expected within 5 years. Many areas may not attain health standards for 10 years, and in some places it may be even longer. It is clear that requirements more stringent than those currently in place are needed if areas with serious air quality problems are to make significant progress toward achieving clean air.

The bill, for those areas that project that they will not be able to attain an ambient air quality standard by December 31, 1992, requires that a proposed new source find emission reductions from existing sources in the nonattainment area in which it proposes to locate that are equal to twice the emissions that it will produce.

Southern California requirements.—New section 172(e)(1)(B)(ii) contains requirements for areas submitting plans demonstrating attainment by December 31, 2002. Based on information currently available, Southern California should be the only area in this category. These requirements thus focus on the South Coast Air Quality Management District (SCAQMD), which has the nation's most serious air pollution problems and will thus require more time than the statute would otherwise permit for attainment of the air quality standard for ozone. While Southern California has the nation's worst ozone problem, the magnitude of the task should not discourage action from being taken today. All areas of the country are expected to attain within the dates provided.

There are additional requirements provided for the South Coast basin, or any other area that fails to meet earlier deadlines, to assure that interim measures are adopted. These additional requirements include: (1) passenger vehicle occupancy of 1.5 persons per vehicle on area highways by December 31, 1997; (2) emissions standards for all stationary or non-vehicular use and for off-road vehicles at least as stringent as standards that apply to light-duty motor vehicles, by December 31, 1997; (3) a requirement that conversion of registered motor vehicles to alternative fuels or power sources with lower emission characteristic achieve 15 percent by December 31, 1997 and at least 40 percent by December 31, 2002; and (4) by December 31, 1990, emissions from new and existing commercial and residential sources generating one ton or more of hydrocarbons or oxides of nitrogen in the nonattainment area are regulated and reduced to the maximum extent practicable.

The additional time provided to the SCAQMD is to allow the regulatory measures adopted to take full effect, not to delay adoption and enforcement of regulatory measures required under the bill or needed for attainment. The new plan requirements must therefore contain fully enforceable schedules for all known (such as those contained in the bill) or anticipated measures needed to achieve attainment, including those measures which may require invention, investment, new technology and changes in transportation systems, fuels and habits.

The bill requires that the implementation plan for the SCAMD assure achievement of the ambient air quality standards for carbon monoxide and nitrogen dioxide no later than December 31, 1997, since the pollution problems associated with these pollutants, while severe, are not as severe as the ozone nonattainment problem. No additional time is needed for protecting public health from exposure to these pollutants, though additional nitrogen dioxide reductions may be needed as part of the ozone attainment plan.

With respect to ozone, the revised SIP shall set forth a strategy and timetable that will achieve the annual and source percentage reductions required by the statute and include regulatory measures which will assure that the additional requirements for decreased passenger use of individual motor vehicles and the changeover to alternative fueled vehicles are achieved on time. No implementation plan can be approved unless it contains specific provisions and timeframes for achievement of these regulatory objectives. Alternative power sources for vehicles will require time to develop and phase in. SCAQMD is expected to begin that process immediately and set forth the regulatory mechanisms including fee proposals, research investments and requirements in the implementation plan required by this section.

CARB should exercise its protected regulatory authority under Title II to assure early and effective implementation of strategies designed to assure that 15 percent of the vehicles registered in the Basin meet the alternative power source requirements by 1997 and 40 percent by the year 2000. State failure to adopt regulations necessary to achieve approved implementation plan requirements will result in a cutoff of highway funds.

The State Air Resources Board may want to apply such regulations statewide. The bill does not discourage this approach. There may be other aspects of the SCAQMD implementation plan that requires State legislation. Once the plan has been adopted and approved, failure of the State to adopt regulations necessary to assist the District in its implementation of its plan in the time required shall result in a cutoff of available transportation funds to the State.

TECHNOLOGY REQUIREMENTS AND DEFINITIONS FOR NONATTAINMENT AREAS

SUMMARY

This section amends section 171 of the Act with respect to the definition of "lowest achievable emission rate" (LAER) by adding to the emissions limitations that a permitting authority must consider in establishing LAER, the most stringent limits included in a permit issued before the application for the proposed source is complete, and by specifying that LAER must be equivalent to the average of the performance of that best-performing 10 percent of sources in the same class or category, in terms of emissions reductions.

The section also adds definitions for the following three terms:

"Major stationary source" or "major emitting facility" is, for the purposes of part D of the Act, defined as "each discrete operation, unit or other activity and each combination thereof that produces or may produce emissions of 25 tons or more per year" of a pollutant for which an area is in nonattainment. For the purpose of the construction ban, municipal solid waste incinerators are excluded from the definition. The bill also provides that a major stationary source is deemed to be modified if changes in it result in increases in ten or more tons per year of a nonattainment pollutant;

"Reasonably available control technology" (RACT) is an emission standard that represents the maximum degree of emissions reduction that a permitting authority determines is achievable for an existing source or class of sources in a nonattainment area. The permitting authority must take into account the toxic character of the pollutant and the degree to which the area needs further reductions and may not determine achievability solely on the basis of the marginal cost per ton of pollution removed. RACT is to be applied to all major stationary sources and other significant sources through a permit system.

The section includes a definition of "vehicle emission control inspection and maintenance program" discussed above.

The bill amends the definition of "nonattainment area" to include areas that the Administrator determines, by rule, are failing to meet a national ambient air quality standard and requires that the extent of a nonattainment area be, at least, the entire Metropolitan Statistical Area that contains a nonattainment area. Counties may be removed from an area that is expanded by operation of the revised definition if the county was not in a nonattainment area prior to the enactment of the Clean Air Standards Attainment Act of 1987; if it is not, itself, in nonattainment; and, in the case of a county with population no greater than 100,000 will not contribute significantly to emissions in the nonattainment area, or, in the case of a county with a population greater than 100,000 will not contribute significant emissions to any nonattainment area. Counties that are removed from a nonattainment area may not be removed from an ozone transport region under other authorities of the bill.

The bill requires EPA, within two years of enactment, to publish control technique guidelines for 11 specified source categories not already subject to such guidelines, and to revise, within four years, the guidelines published prior to enactment. If EPA fails to publish a new or revised guideline by the deadline, the applicable emission reduction requirement for sources in that category will be 90 percent from uncontrolled levels.

DISCUSSION

As has already been discussed earlier in the report, many areas of the nation are failing to meet health-based air quality standards for ozone and carbon monoxide. While in many instances the Clean Air Act already contains authorities to reduce emissions below current levels, those authorities have not always been exercised by EPA, the States, or local air pollution control agencies. This section of the bill, to a great extent, clarifies and emphasizes the extent of authorities that already exist.

Lowest achievable emission rate (LAER).—The 1977 amendments to the Clean Air Act required that sources proposing to locate in a nonattainment area, among other conditions, be required to adopt emission controls as stringent as the most stringent required for a similar source anywhere. In practice, controls required for new sources in nonattainment areas have been little, if any, better than controls in general use in all parts of the nation.

To emphasize the requirement of existing law, the bill requires that permitting authorities examine emission limits in permits issued under requirements of the Clean Air Act, in addition to limits achieved in practice or required in State implementation plans, to increase the possibility that the permitting authority will identify the most stringent limits already required. In any event, the bill requires that LAER be as good as the average of the performance of the best-performing 10 percent (with respect to emission reduction) of sources in the same class or category, thus explicitly ruling out the adoption at LAER of reduction levels that represent only the average or expected performance of all sources in the category.

The bill specifies that, in determining the most stringent emission limit to be required as LAER, the permitting authority must examine the emission limits applicable to similar sources in the same State, emission limits available in EPA guidance documents required by the Act to be distributed to permitting authorities, and emission limits of which the authority has actual notice.

By definition, nonattainment areas are areas where people breathe unhealthy air during at least some periods of a year. New sources, even though subject to LAER requirements, will be adding to the pollution that is the cause of health problems. At the very least, these new sources must be required to reduce emissions to the minimum amount achievable with the best control technology and process design that is currently available.

Definition of "major stationary source".—Current law defines major stationary sources as those that emit 100 tons or more per year of a pollutant. In nonattainment areas the category of "major stationary source" is an important one because if an owner or operator proposes to construct or modify such a source, certain conditions to minimize emissions must be met.

The Environmental Protection Agency in 1981 changed the definition of "major stationary source" for regulatory purposes in nonattainment areas, and subsequent litigation upheld the Agency's change *(Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984)). The effect of the change has been to permit more sources in nonattainment areas to escape the stringent new source review provisions of the Act and, thereby, to avoid minimizing emissions. Under regulations currently in effect, a proposed source can avoid the new source review requirements if emissions reductions elsewhere in the facility offset emissions from the proposed source so that the net increase in emissions is less than 100 tons per year.

The bill defines major stationary sources as "each discrete operation, unit or other activity and each combination thereof" in order to assure that anytime a proposed new operation will increase emissions of a nonattainment pollutant in a nonattainment area by the prescribed tonnage, it must meet the new source conditions of the Act, whether or not simultaneous emissions reductions are achieved elsewhere in the area. The bill also reduces from 100 to 25 tons the amount of emissions that qualify a source as "major".

The language "or combination thereof" assures that where a combination of individual emitting operations will, together in the aggregate, emit 25 tons or more, the requirements of part D applicable to a major stationary source cannot be avoided by treating each operation as a source that is under the tonnage threshold. The aggregate emissions of these discrete operations must also be considered, and if the aggregate meets the prescribed tonnage, part D major stationary source requirements apply.

The bill also establishes that the requirements of part D of the Act applicable to modifications of major stationary sources will be applicable to any change in such a source that increases emissions by 10 or more tons of a nonattainment pollutant.

Definition of "reasonably available control technology" (RACT).— The 1977 amendments to the Clean Air Act required areas that did not meet deadlines established in the 1970 Act to adopt "reasonably available control technology". The term is not defined in the law, and the results, in terms of emissions reductions, from this provision of the 1977 amendments have been far less than they should have been, had the requirement been implemented aggressively by Federal, State and local agencies.

The intent in 1977 was that, in the nonattainment areas of the nation, tough but achievable emission controls would be required of all significant existing emitters of pollutants that caused an area to exceed healthy air standards. The Environmental Protection Agency took a positive step in that direction when it began to issue control technology guidelines (CTG's) for specific categories of sources and declared these to be presumptive RACT determinations for nonattainment areas. State and local air pollution control agencies adopted these, and to the extent that they represented reasonably tough controls, emission reductions were obtained.

As discussed below, however, EPA has not issued guidelines for all significant hydrocarbon sources and State and local officials have not supplemented these CTG's with controls on sources for which no guidelines were issued. Thus, many sources remain lightly controlled or not controlled at all.

The bill requires State and local control agencies to establish, through a permit system, RACT requirements for every major stationary source and other significant sources of a nonattainment pollutant. This is a condition for an acceptable State implementation plan and must be undertaken for all sources covered by the provision, whether or not CTG's are issued by EPA.

The level of control to be achieved is the maximum degree of reduction of emissions the permitting authority determines is achievable by the existing source or class of sources in an area. The concept of "achievability" by the existing source or class of sources in an area. The concept of "achievability" includes both a technological and economic component. The process of establishing RACT for an individual source or class of sources will be similar to the process by which determinations of best available control technology (BACT) are required to be made under existing law in terms of the factors to be considered. These factors include environmental and health consequences of emissions as well as the cost of controls.

The reported bill prohibits the use of cost-effectiveness benchmarks, such as cost per ton of pollution removed, to determine RACT. Indicators of cost-effectiveness such as dollars per ton removed are unrelated to the question of what emission limitation is achievable by a source.

For example, an emission reduction of 95 percent might be achievable for the emission sources at a major refinery that contributes to an ozone non-attainment problem with little impact on the price of the refinery's product. Under the reported bill the permitting authority would be expected to require such a 95 percent reduction, even if another control technology could achieve 75 percent reduction at a lower cost per unit of pollution removed.

EPA, with the encouragement of the Office of Management and Budget, has, in the past, established cost-effectiveness guidelines which have been used to limit the degree of emission reduction required in EPA control technology guidelines and other regulatory actions related to RACT. The continuation of this practice would be inconsistent with the language of the reported bill, or the current law.

Because not all emissions of a particular category of pollutant have equally damaging effects on public health, the bill requires the permitting agency to take into account the toxic nature of an emission stream in determining what level of control to require. Thus, where emissions from a particular source or class of sources contain hydrocarbon constituents that are known or suspected of having toxic effects over and above the adverse effects expected from their ozone-forming potential, stricter emission limits that may entail higher control costs than might otherwise have been required are justified.

The bill provides for a distinction in RACT determinations among areas based on the degree to which they need further emission reductions to attain healthy air quality. An area with a serious nonattainment problem may have to push the limits of technology available for existing sources in order to obtain its needed reductions, while less severely polluted areas may be able to achieve needed reductions by requiring only the best technology that is readily available for existing sources.

While resources available to air pollution control agencies guarantee that RACT will be set for categories of sources and not, in every instance, on a source-by-source basis, the decision as to which sources to include in a category will continue to be an important one. Past experience shows that more often than not, regulating board categories of sources results in less stringent controls for the whole category than would be the case if limits could be set for each source. In a few instances, but only a few, it has been generally agreed among control agencies and the regulated community that particular sources have been included in a category although they are so different in characteristics that it is virtually impossible for them to meet the requirements imposed on the majority of sources. It will be important for a control agency, in deciding which sources to include within a single category, to determine what combination of sources will result in a realistic application of the tightest possible emission limits to all sources. Where inclusion of one or more sources in a category could result in relaxing limits for the majority of sources in order to provide an achievable limit for the minority, the category should be subdivided and separate limits set that will maximize reductions from all sources.

Definition of nonattainment area.—Pervasive and persistent failure to attain ozone air quality standards in many areas of the nation indicates the inadequacy of levels of control currently required of many sources. As more has been discovered about ozone formation and transport, it has become increasingly apparent that the geographic extent of areas designated as nonattainment areas has been too small. Whereas sources of pollution in nonattainment areas—at least significant sources—are required to control emissions to some extent, most often little or no control is required of similar sources that happen to be outside the defined boundaries of the nonattainment area. The existing practice has been to designate as nonattainment areas for ozone, geographic coverage less in extent than an entire Metropolitan Statistical Area (MSA). The result of this narrow definition of ozone nonattainment areas has been a failure to control numerous sources that contribute to unhealthy ozone levels to which millions of people are exposed.

As noted in EPA's draft ozone strategy,

> By definition, an MSA contains a large urban center together with adjacent communities that have a high degree of social and economic integration with that population center. Counties included within an MSA have similar population densities and percentage of commuters to the urban core, hence, large transportation systems and associated vehicular emissions. Due to these emissions and emissions from stationary sources located throughout the MSA/CMSA, EPA believes that attainment of the ozone standard cannot be fully realized in these areas unless the State considers the emissions originating from all the counties within the MSA/CMSA within their control strategy.

The bill requires that where nonattainment areas have been identified that are within an MSA, the entire MSA is to be the designated nonattainment area, and all the requirements that are applicable to nonattainment areas will apply to the entire MSA.

The bill permits the Administrator to remove a county from a nonattainment area designation if certain conditions are met: the county cannot have been in a nonattainment area prior to enactment of this bill; the county must, itself, be in attainment; and the State must demonstrate to the satisfaction of the Administrator that emissions from the county will not contribute a "significant" amount of emissions to total emissions in the nonattainment area from which it is being removed, in the case of a county with a population less than or equal to 100,000, or that emissions from the county will not contribute signficantly or otherwise intefere with attainment or maintenance of the primary ambient air quality standard in any nonattainment area, if the population of the country exceeds 100,000.

Determinations of significance, for purposes of removing a county from a nonattainment area, should be made in the context of the level of reductions considered significant enough to warrant control directives elsewhere in the bill. As discussed below, the bill requires EPA to issue control technique guidelines for 11 categories of sources not heretofore the subject of such controls. The expected reductions from these categories vary from 0.2 percent to 3.7 percent of the total volatile organic compound emission inventory, and the reduction from each category is considered significant with respect to total emissions in nonattainment areas. For a county to be eligible for removal from a nonattainment designation, emissions from the county must be shown to have virtually no [or de minimis] effort on ozone levels in the nonattainment area or areas of concern. Significance must also be judged with respect to the effect future emissions from the county will have on the ability of areas that come into attainment to maintain healthy air quality. This determination must be made taking into account projections of future growth in the county, for if expected growth in population and development is accompanied by growth in emissions, levels of emissions that are not significant today may become significant during the period addressed by an area's implementation plan.

Control technique guidelines.—The Environmental Protection Agency has published 23 control technique guidelines (CTG's), which are used by State and local control agencies to establish RACT for categories of polluters within nonattainment areas. Publication of these guidelines by EPA has been an effective tool in reducing emissions of hydrocarbons because it eliminates duplicative efforts by States to arrive at technological decisions on controls and assures that decisions on controls are implemented in a timely fashion in nonattainment areas across the country.

EPA has issued no CTG's since 1984, and only six have been published since 1978. There is widespread agreement that many of the existing guidelines need revision and that several additional categories should be covered by new guidelines.

The bill requires EPA to publish CTG's for 11 additional categories which were chosen because EPA had already identified them as possible areas for further guidance and because reductions from these sources are among the most significant still to be achieved in nonattainment areas. Revisions of guidelines for the existing 23 categories is also required, and in the event that EPA fails to establish the required levels of control, the bill specifies that sources in the named categories must be required to reduce emissions by 90 percent from uncontrolled levels.

The new and revised CTG's, together with any others the Agency may issue, must meet the definition of RACT contained in the bill, that is, they must represent the maximum emission reduction reasonably available for retrofitting industrial sources, not the lowest common denominator technology.

For the category on "bakeries," EPA is required to consult with the affected industry and with representatives of the Food and Drug Administration and other appropriate Federal and State agencies on its CTG development. Because the quality and sanitation of bread is regulated by the Food and Drug Administration and other agencies, it is important that EPA take into account the effect of proposed emission controls on the quality and safety of the bread produced in bakeries covered by a CTG.

In developing CTG's or establishing emission controls under new section 130, with respect to hydrocarbon emissions which are precursors to the formation of ozone, the Administrator should take into account the photoreactivity of the emission or its potential to contribute to the formation of ozone.

Where sources implement the CTG for bakeries as the adoption of RACT in a timely manner, compliance with source specific reduction requirements and excess emission penalties under section 172(e)(2)(C) and (E) of the Act is deemed to have been accomplished. This requirement is not, however, intended to be premptive of State authority in making RACT determinations or requiring sources to comply with more stringent State requirements, including any penalties.

OZONE TRANSPORT REGIONS

SUMMARY

The reported bill adds a new section 178 to part A of the Clean Air Act to address the effect that emissions in one area may have on ozone levels in another area that is distant from the emitting sources. New section 178 creates two ozone transport regions and directs that a regional commission be established for each. One region includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, and the District of Columbia. The second consists of Illinois, Indiana, Michigan, and Wisconsin.

The Administrator is authorized to create other regions of more than one state and is authorized to add States to the regions created in section 178. To be added to a transport region, States must either contain a nonattainment area or be contiguous to a portion of another State that is a nonattainment area. The regional commission may delete counties from the transport region if the commission determines control of emissions from such county or counties will not contribute to attainment of the ozone primary air quality standard.

The commissions are to be established not later than 6 months after enactment (or 3 months after the Administrator creates a new ozone transport region). Members of the commission include the Governor or Governor's designee from each State, the Administrator, the Regional Administrator (or designee) for each agency region affected by the ozone transport region, and the Federal land manager (or designee) having authority over Federal land in the region.

Decisions of the commission are made by a majority vote of State members, with the concurrence of the Administrator. The Administrator is under an obligation to try to mediate any disputes among commission members.

Two years after enactment, attainment areas within the region must implement a vehicle inspection and maintenance (I/M) program for Metropolitan Statistical Areas with a population of 125,000 or more (according to the 1985 census). All attainment areas within the region must also implement reasonably available control technologies for which control technique guidelines were available before enactment. These requirements are deemed to be requirements of an applicable State Implementation Plan (SIP) for each area in the region.

In Virginia, I/M is required for the geographic region specified in the reported bill and for the Richmond-Petersburg MSA. In other States, I/M is not required for an MSA that is attaining the ozone standard and that, in its entirety, is more than 100 miles from any nonattainment area.

The regional commissions are to develop a regional attainment strategy and identify additional categories of sources for which reasonably available control technology shall be adopted within the region. Such additional requirements must be incorporated into the SIP of each State in the region within one year. Failure to do so constitutes plan inadequacy under section 110(a)(2)(H).

The Administrator shall seek to assure that emissions arising in the State for which the SIP is submitted do not prevent attainment or maintenance of attainment in any other State.

Ozone transport region commissions are interstate air quality commissions under section 106 and thus eligible for Federal assistance.

DISCUSSION

Ozone transport is a serious problem for affected nonattainment areas. Areas in some States may be unable to attain the ozone standard despite implementation of stringent emissions control because of pollution transported into such areas from other States. Areas in States where the pollution is actually generated may, because atmospheric conditions transport pollution out of the region, experience ozone levels that are not as high as they would have been had the pollution remained within the State's borders. Some of these areas may be attaining the ozone standard and yet contribute substantially to ozone levels in downwind areas.

The transport problem in the two regions identified, and perhaps others as well, is serious enough that additional efforts must be made on an interstate basis to control emissions, including emissions from attainment areas.

Many areas in the transport regions are attainment areas for ozone by virtue of location. This is particularly true for coastal areas, some of which benefit from breezes that blow pollution either out to sea or further up the coast. Sources in these areas must be controlled if the downwind areas are to attain.

Control of emissions of nitrogen oxides as well as hydrocarbons is needed to protect against transported ozone problems. Recent research indicates that controls on both nitrogen oxides and reactive hydrocarbons must be considered if overall ozone levels are to be lowered. A critical implication of these findings is that without controls on nitrogen oxides the current control policies will simply change the urban ozone problem into a regional one.

Evidence of this has been shown in Southern California, where emissions of nitrogen oxides in downtown Los Angeles react with ozone in downtown areas to form excess nitrogen dioxide. This nitrogen dioxide photodecomposes into increased ozone during transport of the polluted air mass from the downtown area into the mountain and desert regions of Southern California.

A Wisconsin study of excess ozone levels in the Milwaukee area documents the occurrence of interstate ozone transport due to the interaction of offshore breezes and other shore effects with pollution-laden air masses over Lake Michigan.

Transport has been documented in the northeast with EPA time sequence maps. The maps illustrate the typical flow of an ozone plume in the Northeast as it moves from New York City into New England. In the early morning, the plume centers were over southern New England. By mid-day the plume extends to central New England, Cape Cod, and western Massachusetts. By late afternoon, the episode pushes toward northern New England. As it moves north, the plume combines with other emissions centers in New England.

Clear proof of the transport problem is Acadia National Park, which has been a nonattainment area. This popular national park on the coast of Maine attracts visitors because of its vistas and clean air. This area does not on its own produce enough emissions to violate the ozone standard. Much of the air over Acadia travels up the coast through urban centers of the eastern United States. While it is not currently possible to identify with certainty the exact origins of the pollution, control of downwind sources will help assure that this and other national parks meet and maintain compliance with national air quality standards.

OMNIMAP is a recently completed airshed model for the New York, New Jersey, and Connecticut metropolitan area. The model suggests that even if all emissions sources were eliminated within the tri-state area, violations of the ozone standard would still occur. This means substantial reductions in emissions from areas upwind from the New York metropolitan area must be achieved if this area is to attain the air quality standards.

Ozone transport commissions are one way to address these problems. State air quality directors in the northeast have been cooperating for several years to develop a regional solution to the ozone problem. Lack of support by EPA and lack of authority to institute needed regional controls (both in attainment and nonattainment areas) have prevented this effort from being more successful. As an indication of the seriousness with which the northeastern States regard the transport problem, most of them recently signed a memorandum of understanding to limit the volatility of fuels in the summer to control the ozone problem. EPA has authority to control such volatility but has not exercised this authority to date. [See section 211(i).]

EPA's Regional Oxidant Model (ROM) should operate as soon as possible in order to assist the work of the regional commissions. This is a computer-based model of ozone transport patterns for many eastern cities and a tool that should be available to the commission for use in determining where additional control measures may be necessary to achieve downwind improvements in air quality. ROM, EKMA, OMNIMAP and other computer models are useful tools that should be utilized, but they are not the solution to our air pollution control problems. There are technical limitations to the precision and explanatory power of such models.

Operation of ROM should be a funding priority for the agency. In the agency's red-border review package of its post-87 ozone and carbon monoxide strategy, there was a commitment to operate ROM within three years. Unfortunately, the Federal Register notice appears to retreat from this commitment, making operation of ROM more problematic.

If ROM is not functioning due to lack of resources, the agency should come forward to request adequate funds. If there are other reasons for delay, notification to ozone transport commission members and to Congress is warranted.

The regional transport commissions are authorized to require implementation of additional control measures for sources within the region in order to address the transport problem. The Commission cannot decide to eliminate otherwise applicable control requirements. Decisions of the commission are made by a majority vote of State representatives with the agreement of the Administrator. This provides the Administrator the authority to veto decisions of the State representatives of the Commission. The Administrator should not veto control measures simply because EPA does not support implementation of such measures as a matter of national policy, but may veto adoption if such measures impede attainment.

EPA should actively encourage States to develop and coordinate effective, enforceable control strategies. The regional transport commissions are considered to be interstate air control agencies for the purposes of section 106, and thus qualify for Federal assistance.

Requirements within ozone transport regions, both for attainment and nonattainment areas, differ in certain respects from the requirements for areas outside such regions. The inspection and maintenance requirement for attainment areas within a transport region applies to MSA's of 125,000 persons or more (based on 1985 census data). Nonattainment areas of 100,000 persons or more, both within or outside a transport region, must implement inspection and maintenance programs. Reasonably available control technologies are required for all existing major sources for which CTG's have been issued prior to the date of enactment of the reported bill, in attainment areas of control regions, and additional controls may be required by agreement of the commission. All such control requirements must be incorporated into the individual SIPs within one year after such requirements are identified by the commission.

INTERSTATE TRANSPORT

SUMMARY

The reported bill refines those provisions of the Clean Air Act, principally sections 126 and 110(a)(2)(E), that deal with interstate air pollution.

The bill amends section 110(a)(2)(E) of the Clean Air Act by including the plural "sources"; by replacing "prevent" with "interfere with"; and by adding further language requiring States to prohibit emissions of air pollutants which may reasonably be anticipated to cause or contribute to an adverse health, welfare or environmental effect in another State or foreign country.

The bill amends section 126 of the Clean Air Act by adding a new subsection (d) which states that emission of an air pollutant which, by itself or in combination, reaction, or transformation, adversely affects public health or welfare in another State, is a violation of this section.

Section 126 is also amended by removing the reference to national ambient air quality standards in subsection (a) and by including groups of sources under subsection (b). Finally section 126 is further amended in subsection (c) by noting that sources which do not install reasonably available control technology within two years from the date of a subsection (b) finding are subject to a section 113(d) enforcement order.

The reported bill amends section 302(h) of the Clean Air Act by inserting the phrases "precipitation," and "whether caused by transformation, conversion, or combination with other air pollutants.".

DISCUSSION

This amendment is designed to improve the workability of the Clean Air Act as a means of dealing with interstate air pollution. It is modelled on recommendations of the National Commission on Air Quality.

Section 110(a)(2)(E) and section 126(b) apply only to a single "source", which makes them ineffective for the purpose of controlling pollution from a city or state, where the pollution may be originating for hundreds or thousands of smokestacks and tailpipes. The amendment to section 110(a)(2)(E) and 126(b) include the plural "sources", thus making the law available against multiple polluters, including cities and states.

For interstate pollution to violate current law under section 110(a)(2)(E) it must "prevent attainment". It may be impossible to say that any single source is the one which actually prevents attainment. This amendment changes "prevent" to "interfere with", thus making it clearer when a violation occurs.

Under current law section 110(a)(2)(E), the interstate pollution which is illegal is that which leads to a violation of one of the Clean Air Act's specifically protected interests—attainment of the standards, visibility, prevention of significant deterioration, etc. There are many legitimate State interests that are not spelled out and explicitly protected by the Clean Air Act. The amendment to section 110(a)(2)(E) and new section 126(d) makes an injury to these other interests—described as an "adverse effect on public health or welfare—a violation of the Act.

The reported bill strikes "in excess of ambient standards" from, section 126(a)(1)(B) to conform to the change in section 110 described in (b) above. Under current law, interstate pollution must lead to a violation of the ambient standard to be actionable under sections 126 or 110. It may not be possible to state exactly which source is the single polluter that causes nonattainment, so this current requirement may effectively negate the purposes of the interstate provisions. The amendment eliminates the need to establish a linkage between a polluter and violation of an ambient standard.

The current law allows section 126 to be used only for violations of section 110(a)(2)(E)(i), which relates to the preparation of a State Implementation Plan. Thus, a State being injured by another State's pollution can file a complaint about the offending State's SIP, but not the pollution itself. The remedy is essentially procedural in nature. The amendment to section 126(b) adding "or this section" would allow a State to complain about the pollution itself, not just a defect in the offending State's SIP.

Under the current law, once the Administrator finds that a source is emitting pollution which is injuring another state, the polluter can continue to operate for only another three months. This ban applies only to a "major existing source", thus making it unavailable against multiple smaller sources. The amendment to section 126(c)(2) expands the prohibition to all sources large enough to require regulation under the law and provides two years for them to retrofit with Reasonable Available Control Technology (RACT).

Under current law the definition of "welfare" protected by the Clean Air Act may not include the quality of the precipitation itself. It also may not include damage that results from conversion of a pollutant from one chemical to another—which happens with both acid rain and smog. The amendment to section 302(h) explicitly includes precipitation as a protected value and clarifies that transported, converted, and combined pollutants are all covered.

The Clean Air Act allows a State to file a petition with the Administration complaining of interstate air pollution, but not to file a lawsuit for violation of section 126. The amendment to section 304 would allow a State, and citizens, to sue in Federal district court for violation of section 126.

Sanctions

SUMMARY

The reported bill amends sections 110(a)(2)(I) and 176 of the Clean Air Act to modify the sanctions established in the Act for failure to attain the ambient air quality standards and for failure to submit or implement an implementation plan. Section 110(a)(2)(I) is amended to ban the construction or modification of any major stationary sources of a precursor to a pollutant for which the area is nonattainment, in any area (i) which is not in attainment of primary ambient air quality standards by the statutory deadline for such area, (ii) for which an adequate State implementation plan has not been submitted, in accordance with section 110 (including in response to subsection (a)(1)(H)) or part D; or (iii) for which an adopted or promulgated implementation plan is not being completely implemented.

Section 176(a) is amended to prohibit the use of any Federal-aid highway funds in any nonattainment area (i) which is not in attainment of primary ambient air quality standards by the statutory deadline for such area; (ii) for which an adequate State implementation plan has not been submitted in accordance with part D;

or (iii) for which an adopted or promulgated plan is not being completely implemented.

Section 176(b) is stricken and replaced with a ban on new sewer hookups in any nonattainment area with a deadlne of 1997 or 2002, for which an adequate State implementation plan has not been submitted in accordance with part D, or for which the area and source specific requirements and offset requirements of part D are not being completely implemented.

The reported bill adds a new subsection (e) to section 176, providing a limited discretionary waiver or delay of the construction ban or highway funding cut off for failure to attain the ozone primary standard by the statutory deadlines. This waiver is available to areas that have made good faith efforts to attain the standard by the deadline, and only on the condition that more stringent control requirements are implemented in the area during the waiver period. No waiver of the sanctions for failure to attain may last more than 3 years.

DISCUSSION

Sanctions play two roles under the Clean Air Act. First, they are a powerful incentive for States and areas to make the maximum effort to come into attainment with the health-protective ambient standards by the statutory deadline, and to adopt and enforce necessary control measures that might otherwise be difficult for some States and localities to accept. Since the Supreme Court's 1975 decision in *Brown* v. *EPA,* the ability of the Federal government to effectively order States to adopt and implement specific control measures has been limited. To compensate for those limitations, the 1977 Clean Air Amendments adopted a series of requirements, including specific control measures, that States must carry out to obtain an extension of the statutory deadline, and provided sanctions for the failure to carry out those requirements.

Secondly, the sanctions provided in the Clean Air Act and the reported bill in themselves contribute to cleaner air. The construction ban of section 110(a)(2)(I) blocks the addition of sources of air pollution to already highly polluted areas that are not properly implementing the Act. Likewise, eliminating the funding of highway projects attacks one of the fundamental problems of areas suffering nonattainment for a mobile source-related pollutant. Such sanctions are not intended, however, to be a permanent substitute for a control program. By their great stringency, such sanctions still act as an incentive to States and local areas to adopt the control measures contained in the reported bill.

One criticism of the current law is some uncertainty about when the sanctions apply. The reported bill clarifies that all the sanctions are automatic if certain failures occur. On the other hand, while the current law imposes the construction ban automatically if an area fails to attain the ambient standard by the deadline, and provides no means for extending that deadline, the new section 176(e) allows a limited further "good faith" delay of the sanctions.

Section 110(a)(2)(I) and section 176(a) require sanctions to be imposed for essentially the same failure. Subparagraph (I)(i) and subsection (a)(1) provide an automatic sanction for failure to attain the health-protective ambient standard by the relevant deadline. This is either 1990, 1992, 1997, or 2002 for ozone nonattainment areas, or 1992 or 1997 for carbon monoxide nonattainment areas depending on the choice of the area and the severity of the problem. Whether an area has attained the standard is an objective question, determinable through monitoring, and does not necessarily depend on certification by the Agency. Ordinarily, the Agency and the State will have monitoring data available in advance of the statutory deadline that will allow interested parties to know whether an area will be in attainment. The sanctions remain in effect until the area comes into attainment.

Section 110(a)(2)(I)(ii), section 178(a)(2), and section 176(b)(1) impose sanctions if the State has not submitted an implementation plan that meets the requirements of part D. This includes the requirement that the plan be submitted on time as provided in section 172(e)(2). If it is not, the sanctions remain in effect until an acceptable plan is submitted and approved. It also includes the requirement that the plan demonstrate that its provisions assure attainment by the relevant statutory deadline. Section 176(b) only applies to plans required for 10- and 15-year areas. The reference to section 172(b)(11)(B) is to assure that sanctions continue to apply in the period immediately after enactment to areas that have not yet implemented vehicle inspection and maintenance programs.

Section 110(a)(2)(I)(iii) requires the construction ban sanctions for failure to submit an adequate implementation plan to implement a new or revised ambient standard such as PM10 or those required under title IV of this bill. It also applies in cases of notices of plan inadequacy, or "SIP calls".

Section 110(a)(2)(I)(iv), section 176(a)(3), and section 176(b)(2) impose sanctions for failure to implement requirements of an applicable implementation plan or requirements of hydrocarbon emission controls under new section 130 (which are deemed to be requirements of applicable implementation plans).

Because of changed definitions under the reported bill, the construction ban will be more vigorous and effective than that in current law. With major stationary sources defined as those in excess of 25 tons per year, and the definitions of new sources clarified to eliminate the practice of "netting" to avoid new source review, the construction ban will apply to many more sources.

The reported bill repeals one sanction available under current law, the air program support grant sanction of section 176(b). It appeared to be counterproductive.

The cut off of highway funds under section 176(a) is made clearly automatic, applicable to failure to attain the standard as well as failure to submit or implement acceptable plans. The subsection allows limited exceptions to the funding cut off, for safety projects, mass transit projects, and transportation improvement projects designed for air quality improvement or maintenance. Similar exception language in current law has been too broadly interpreted. In implementing this mandatory sanction the Secretary of Transportation shall seek to minimize the number and breadth of such extensions, limiting them to projects that actively improve air quality. The Secretary and the Administrator are expected to promptly enter into a new memorandum of understanding to implement this subsection, section 176(c) and (d), and other provisions of the reported bill with transportation implications.

New section 176(b) bans any new sewer hookups in a nonattainment area after a violation of the sanctions conditions occurs. This includes a failure to submit a plan for a 10- or 15-year area, or a failure to implement the area percent reduction, source specific percent reduction, emissions fee, and excess emission penalty provisions or the two-for-one offset in such areas. The prohibitions of both subsection (a) and subsection (b) of section 176 are enforceable through citizen suits under section 304, as requirements of an applicable implementation plan.

Section 316 of the Clean Air Act, providing a discretionary sanction on sewage treatment construction grants, is not amended by the reported bill. The provisions of section 176(b) are modeled in part on section 316 and in part on section 402(h) of the Clean Water Act. Sewer hookup moratoria have been effective sanctions under that law. In the clean air context, such sanctions help protect an area against growth that indirectly causes increases in emissions from vehicles or area sources.

The sanction of section 176(b) can be imposed or enforced as a condition on a Clean Water Act permit for a publicly owned treatment works or on a grant for such a facility. The sewer hookup ban can also be enforced directly in Federal court against those industrial, commercial or residential developments who wish to hookup or against the publicly owned treatment works. A treatment works owner may raise the affirmative defense that the implementation plan expressly provides for the emisisons growth associated directly or indirectly with the proposed hookup and requires a four-to-one offset (or reduction from existing emissions) to accommodate it. If these provisions of the plan are not being properly implemented, the sewer hookup ban applies anyway. This affirmative defense requirement could be met by projects undergoing a process for the preconstruction review of indirect sources with a four-to-one offset for all potential emissions increases associated with the project.

The waiver of the construction ban and highway funding sanctions under new section 176(e) applies only to the failure to attain the ozone standard. It is available only where the Administrator has made a determination that all good faith efforts have been made by the State and the affected local governments to attain the standard by the applicable deadline. This includes the submittal of a State implementation plan that, within the limits of science as of the time of approval, clearly demonstrates that its requirements can be expected to attain the standard by the deadline. Good faith also requires the complete and timely implementation of all such requirements.

The waiver authority of section 176(e) is discretionary, in that the Administrator is not required to grant it. Although the Administrator has much flexibility as to what constitutes good faith efforts (beyond that discussed in the previous paragraph), section 176(e) specifies several conditions on any waiver or delay that is granted. This follows the basic principle of the reported bill that increasingly more stringent control measures are a condition of more time for compliance. The sanctions cannot be delayed longer than three years after the applicable deadline (and only two years, in the case of areas initially selecting a 1990 compliance date.)

Areas receiving waivers must implement the more stringent control measures adopted under section 172(d)(1)(H). Having adopted these with the original revised implementation plan will assure the immediate implementation of more stringent measures without the delay of further plan revision. Ordinarily such measures will at least be the control measures that apply to areas with the next longest deadline (i.e. 5-year area requirements imposed for 3-year areas waivers, 10-year area requirements for 5-year area waivers). Ten- or 15-year areas receiving extensions must take whatever measures are necessary to attain in an additional 3 years. All areas receiving waivers (other than those selecting 1990 deadlines) must use a definition of major stationary source of 10 tons per year for RACT, LAER, new source review, offset requirements, and future, post-waiver construction ban sanctions. This lower major source definition does not apply if the waiver is not granted. An area may receive only one waiver.

EPA is required to act on a waiver request within four months of receipt. Ordinarily, an area would submit such a request in advance of the statutory deadline for attainment. On and after the deadline, the Administrator may stay the sanctions for up to six months, or until the waiver request is acted upon, which ever is earlier. This authority to stay the sanctions is completely discretionary. During any stay the more stringent contingency measures must be immediately implemented. Even if the waiver request is not subsequently granted, these measures will help an area come into attainment and thereby end the sanctions, at an earlier date than otherwise.

New section 176(e) spells out several considerations for the Administrator in determining good faith. While these are not absolute requirements, the Administrator should give great weight to them. The first is whether implementation of the plan has resulted in actual emission reductions. The suggested measure is whether the area has achieved at least 90 percent of the reduction in emission inventory the plan committed to accomplish through local control measures. This includes RACT, transportation controls, and the implementation of section 172(e)(2)(B). It does not include the reductions expected from Federal controls such as the motor vehicle program. Areas should not be sanctioned for the failure of the Federal Government and EPA to do their part.

In evaluating whether an area has made good faith efforts to pursue remedies for interstate transport of pollutants, the Administrator should consider the area's participation and cooperation in an ozone transport region under section 178, if applicable. While there is no specific measure of improvement in air quality required under paragraph (2)(C), as a matter of common sense there must be some quantifiable improvement in air quality to demonstrate good faith under this subsection.

The justification for this waiver provision is that despite well-intentioned and aggressive efforts in planning and implementation, unanticipated factors that could not have reasonably been forseen may prevent attainment of the ozone standard by a statutory deadline. Paragraph (2)(D) is intended to encourage implementation planners to make extra efforts to foresee potential complications and problems, and build in additional reductions and other strategies to compensate for them. Variations in weather are foreseeable. Plans should reduce emission inventories enough that weather does not interfere with attainment.

TECHNICAL AND PLANNING ASSISTANCE

SUMMARY

The reported bill amends section 175 of the Clean Air Act to authorize grants to States to pay the reasonable costs of developing State implementation plan revisions required by the 1987 amendments and the costs of developing State implementation plans to implement the recently promulgated national ambient air quality standard for particulate matter with a diameter of 10 micrometers or less.

New section 175(d) requires the Administrator to make grants to nonprofit organizations in nonattainment areas, so that such organizations may obtain technical assistance to facilitate their participation in the revision of State implementation plans and the selection of control measures.

The reported bill provides a single, no-fiscal-year authorization of $75 million for grants to States for SIP development and for technical assistance grants to nonprofit organizations.

DISCUSSION

The 1977 amendments to the Clean Air Act authorized $75 million for special grants to help provide the increased air quality planning that was required under those amendments. Support grants under sections 105 and 106 are committed to on-going activities in States, and legislation such as the reported bill often creates new, one-time responsibilities for States and local governments involved in air pollution control. The purpose of this authorization is to provide adequate resources to States and involved local governments to meet their new responsibilities, without diminishing their level of effort at on-going responsibilities.

Amendments to part D of the Clean Air Act made by the reported bill will require substantial work by States and affected local governments with areas that will remain in nonattainment after the current deadline of December 31, 1987. Similarly, States with areas that exceed the recently promulgated national ambient air quality standard for particulate matter (PM10) must also develop a State implementation plan, during the same period that many will be required to develop SIP revisions in response to this bill. Funding for both SIP development responsibilities will avoid disruption of continuing programs in the States.

Grants under new subsection (c) are to be made in accordance with subsections (a) and (b), to the extent consistent with the authority of subsection (c).

Part D requires the participation of the public, as well as local government officials, in the development of SIP revisions and the selection of control measures. It is often difficult for the public to participate in a meaningful way because of a lack of information or technical expertise in evaluating control options. The purpose of new subsection (d) is to provide technical assistance to local civic groups, transportation users, local or national environmental organizations, or other nonprofit organizations with an interest in local air pollution control options.

Grants may be used to acquire consultant services to gather or interpret information, to develop or analyze alternative control measures, and to present such information or alternatives to the State and the Agency as the implementation plan undergoes public review. An effective technical assistance program will allow the public to participate at early phases of information gathering and the articulation of alternatives, not just at the public hearing stage. It will be important to provide such grants early in 1988, and the provision of such grants is not to await the publication of any formal regulations. Grants are not intended to be used to underwrite legal actions. Any information developed through grant assistance may be used, however, in any legal action involving the adequacy or implementation of the plan. Since these grants are limited to nonprofit organizations, it will not be appropriate to provide grants to trade associations, chambers of commerce, or other organizations with a large membership of profit-making entities.

OUTER CONTINENTAL SHELF AND VESSEL ACTIVITIES

SUMMARY

The reported bill adds a new section 129 to the Clean Air Act requiring the Administrator, inconsultation with the Secretary of the Interior, to promulgate regulations governing air emissions from activities regulated under the Outer Continental Shelf Lands Act, whether the source of such emissions is a stationary source or a vessel. In such regulations the Administrator must establish requirements for such sources to assure that such sources do not prevent or interfere with the attainment or maintenance of any ambient air quality standards in any State (including requirements for the prevention of significant deterioration of air quality) or with the requirements of any State implementation plan implementing such standards.

Regulations under new section 129 also shall specify how the requirements established under this section are to be incorporated into State implementation plans and how such plans should account for emissions from Outer Continental Shelf (OCS) sources. In establishing requirements under this section, the Administrator is to take into account the proximity of any OCS source to the closest affected State or local jurisdiction, and the degree to which the same requirements applicable to comparable onshore activities in the closest affected State or local jurisdiction should apply to OCS sources. New section 129(d) provides that regulation of OCS sources may not be more stringent than regulation of similar non-OCS sources.

The Administrator is required to promulgate these regulations not later than 12 months after enactment. The reported bill also amends section 204(a)(8) of the Outer Continential Shelf Lands Act to end the Secretary of the Interior's current authority to regulate air emissions from OCS sources when the Administrator promulgates regulations under new section 129 of the Clean Air Act.

The reported bill adds a new subsection to section 110 of the Clean Air Act, clarifying that States and air pollution control agencies are authorized, in the adoption, implementation or enforcement of any provision of a State implementation plan, to control air emissions from any vessel while in port or on tidal waters within the boundaries of the State.

DISCUSSION

The Outer Continental Shelf Lands Act provides authority for the Secretary of the Interior to regulate air emissions from OCS sources. The Marine Minerals Service, the division of the Interior Department charged with this responsibility, however, is not an expert agency for air pollution control. Regulations for air emissions from OCS sources, particularly those off the coast of Southern California, have been controversial and are the subject of pending litigation brought by the State of California. At the time of Committee consideration of the reported bill, a negotiated rule-making was in progress to replace the current regulations affecting California OCS sources.

Several studies have documented that OCS development activities significantly affected onshore air quality and impede State and local efforts to attain ambient air quality standards. The regulatory scheme promugated by the Department of the Interior does not appear to be adequate to avoid this effect. For example, the environmental impact statement for the Exxon Santa Ynez unit observed that that single project by itself would cause areas of Santa Barbara County, California, to exceed the ozone ambient standard, despite compliance with the Interior Department regulations. The cumulative effect of a number of platforms and drilling rigs can prevent an onshore area from attaining ambient standards.

Local air quality management districts in Southern California are required to take into account the added impact of offshore emissions in developing air quality management plans. Since neither they nor EPA currently has the authority to control those offshore emissions, onshore sources must be more stringently controlled to offset the contribution of OCS sources. EPA has stated that as a result of control requirements falling disproportionately on onshore sources, "onshore industrial growth may thus be precluded by the impacts of offshore development". For example, a recent EPA study concluded that, for a given day, existing OCS operations in the Santa Barbara Channel produced at least ten percent of the ozone in the air basin in which Santa Barbara County is located. By the mid-1990's projected OCS development could account for emissions of oxides of nitrogen equal to nearly half of Santa Barbara County's current onshore emissions inventory.

The purpose of this provision is to protect and enhance onshore air quality with respect to the impact of offshore air emissions. New section 129 will consolidate air quality management for both onshore and offshore activities under a single agency and statute. This will provide the experience and expertise necessary for regulation of offshore emissions, and assure comparable regulation for onshore and offshore facilities. Also, by incorporating offshore emissions and the newly-authorized EPA regulation of them into the State implementation plan structure, the reported bill will allow the equitable consideration of controls on offshore facilities, avoiding the disproportionate regulation of onshore sources to accomodate offshore development. The reported bill will also assure that OCS sources will be regulated comparably to production platforms, supply vessels and drilling rigs located in State waters.

In developing regulations for air emissions from specific OCS sources or classes of sources, the Administrator is required to take into account the proximity of the source to the closest affected State or local jurisdiction. Part of that determination involves a source's contribution to the total emissions within the affected airshed, meteorological data, the tracing of air masses through monitoring and air trajectory modeling, and other relevant factors. Where sufficient meteorological data is lacking to track or model the path of an air mass, the Agency may require additional data collection by the offshore platforms.

Allowing proximity to help determine the degree of regulation required for a particular source reflects the fact that in OCS areas distant from the shore, as in the Gulf of Mexico, meteorological conditions may make offshore activity less a factor in onshore air pollution. While physical distance is not the only measure of proximity, however, as a mater of policy OCS sources within 50 miles of shore can be said to significantly contribute to air pollution onshore and all such sources should be regulated within the most stringent category of regulation, fully comparable to onshore sources.

A large number of platforms or drilling rigs, even distant from the shore, of course could have an effect on onshore air quality. This problem may lead the Administrator to establish uniform minimum emission control requirements for all platforms, drilling rigs, and supply vessels, no matter how distant. The regulations under section 129 must take into account the particular phase of development or production over the lifetime of the platform. Drilling rigs are to be regulated, with no exemption for any temporary character. Vessel operations associated with the OCS are also to be regulated.

This provision is not intended to give those generally opposed to offshore oil and gas development a means of erecting barriers to such development. This new Clean Air Act authority should not be used to discriminate unfairly against offshore sources, and to that end, section 129(d) requires that regulation of OCS sources not be more stringent than regulation of similar non-OCS sources.

New section 110(k) addresses another problem, that of nearshore or in-port emissions from vessels. This is a clarification of authority under existing law. More than ten States in recent years have considered regulations controlling vessel emissions in the development of State implementation plans. While this provision does not mandate the regulation of vessel emissions (other than those associated with OCS activities under section 129), it reaffirms the authority of States and local air pollution control agencies to do so.

Regulation of vessels may include control of emissions of oxides of nitrogen and other pollutants associated with vessel propulsion or power requirements, and control of cargo or fuel loading emissions. It is expected that any regulations developed under this authority would have adequate regard for the safety of the operation. The National Research Council has undertaken at the request of the Coast Guard a Marine Board Study of the Control and Recovery of Hydrocarbon Vapors from Ships and Barges. This study, which only incidentally will address the occupational health or environmental aspects of vapor recovery from vessel loading, is expected to be published in November, 1987. At least one marine vapor recovery system, collecting six tons of hydrocarbon vapors each time a vessel is loaded, has been built and approved by the Coast Guard for safety.

It might be helpful to States and local air pollution control agencies considering regulation and emissions from vessel engines if the Agency were to publish control technique guidelines or similar guidance. This would allow greater consistency among ports with such regulation. This is not necessary, of course, for controls of a purely operational character, such as operating at a lower power setting in near-shore waters.

TITLE II—ACID DEPOSITION CONTROL

INTERSTATE TRANSPORTATION AND ACID PRECURSOR REDUCTION

BACKGROUND

This title adds a new part E to the Clean Air Act for the express purpose of reducing the emission, transport, transformation and deposition of air pollutants generally, and acid forming compounds specifically. The new part applies throughout the United States, and deals most directly with sulfur dioxide and oxides of nitrogen, although other pollutants also may be subject to regulation under this part. The title also adds a new part F authorizing a 5-year program to demonstrate at the commercial scale new clean coal technologies to reduce emissions of sulfur dioxide and nitrogen oxides.

FINDINGS AND PURPOSES

New Section 180 establishes the findings and purposes that are the predicate for the regulatory program established by the title, as well the complementary controls located in other parts of the bill. The findings and conclusions include the following:

Finding

1. The long-range transport of pollutants and their transformation products is an interstate and international problem.

Discussion

This finding reflects the strains created not only between the United States and her closest ally, Canada, but among the States themselves by the interstate transport of air pollution generally, but most especially acid rain. Relations which heretofore have been harmonious and cordial are increasingly characterized by acrimony, suspicion and distrust. Rightly or wrongly, some States and industries are perceived as subsidizing their electricity rates by sacrificing the health and environment of their neighbors. Conversely, others—again rightly or wrongly—perceive many of these issues as cynical and calculated attempts to increase the cost and thus reduce the competitiveness of electric power generated in the United States.

These emotions serve to cloud the issues and a major goal of the bill is to restore the comity and amity which previously prevailed among the States and between the two nations.

Acid rain is created when oxides of sulfur and nitrogen are emitted—most often from electric utilities—and then transformed in the atmosphere or on surfaces into sulfuric and nitric acids. The process is relatively straightforward.

Sulfur (S) is contained in almost all fossil fuels, but especially coal. When burned, the sulfur combines with the oxygen in the air to create sulfur dioxide (SO_2).

Sulfur dioxide (SO_2) is a colorless gas, so it cannot be seen with the naked eye. It is, nevertheless, a powerful lung irritant which can cause lung seizures in asthmatics and other sensitive groups. When SO_2 is transformed into sulfate—a process which begins almost immediately—it escapes regulation under the Clean Air Act. SO_2 emitted by powerplants and other industrial sources combines with oxygen in the atmosphere to form sulfate (SO_4) .

Sulfate (SO_4) is an extremely fine particle, capable of reaching the deepest recesses of the lung. Coincidentally, the sulfate particle is also perfectly sized for reducing visibility. This is one reason that airport visibility measurements are sometimes used as a surrogate for sulfate concentrations. When sulfate settles out of the air onto leaves, buildings or other surfaces it attracts water, which converts it into sulfuric acid (H_2SO_4). If inhaled, the lung's own moisture supports the conversion. And, if the SO_4 is washed out of the air by fog, clouds, mist or rain, it has become "acid" rain, as it is popularly called.

Sulfuric acid (H_2SO_4) is powerfully corrosive and can therefore directly damage tissues and materials. But it can also start a chemical reaction of its own, with effects that ripple through an ecosystem. When common dirt is washed in acid, heavy metals that were tightly bound to the soil particles—aluminum, lead, and mercury are three examples—are dissolved, entering the water runoff in massive quantities. Aluminum, for example, increases 1000 percent for every 100 percent increase in rainfall acidity. Thus if the acidity of rain increases 10-fold—which almost all agree is a fair definition of how "acid" today's acid rain is—the aluminum content of rainwater runoff increases 10,000 percent.

Exactly what damages can be fairly attributed to aluminum and other heavy metals freed by acid rain has not been sorted out completely. It is well established that the aluminum is extremely toxic to fish if it reaches lakes and streams. Many scientists believe that it is aluminum which is primarily responsible for the losses of lakes thorughout Scandanavia, Canada and New England, rather than the sulfuric acid itself. It is equally clear that some of the other heavy metals—especially lead, cadmium and mercury—can pose a serious threat to human health as drinking water contaminants. Whether they are reaching these dangerous levels because of acid rain and, if so, in how many cases, is unclear.

Nitric acid (HNO_3). Nitrogen undergoes a fairly similar process of conversion: nitrogen (N_2) combines with oxygen (O_2) to form several different oxides (N_2O_2.N_2O, NO_2, etc.). These, in turn, form nitrates which, when exposed to water convert to nitric acid. There are, however, some important differences.

Oxides of nitrogen (N_2O_2, N_2O, NO_2) can be created because nitrogen is found both in fuels and in the air. Roughly 80 percent of the air is nitrogen, and almost all fuels other than natural gas also contain it. But the oxides are not formed until the heat and pressure of the combustion process are brought to bear. The combustion may take place in the cylinder of a car or the furnace of a giant coal-fired powerplant. But in either case, the combustion temperature and pressure are determinants of how much nitrogen is converted to oxides of nitrogen.

These oxides, like SO_2, are irritants which are regulated under the Clean Air Act. And, again like SO_2, they escape its coverage when they combine with oxygen to form nitrates (NO_3).

Nitrates (NO_3), like sulfates, are fine particles which can reach the cellular levels of the lung. Unlike sulfates, nitrates and other nitrogen-based compounds are considered beneficial to vegetation because they are plant nutrients. For this reason, some scientists and policy makers have tended to minimize the role which oxides of nitrogen, nitrates and nitric acid have played in the damage caused by acid rain and plans for its control.

Within the past several years, however, as scientists have searched for plausible explanations for the forest damages found throughout much of Europe and Eastern North America, they have begun to question whether one answer might be an "over fertilizing" effect of nitrogen compounds. There have also been suggestions that nitric acid could free heavy metals before being taken up by vegetation.

Nitric acid (HNO_3) thus may or may not be the equal of sulfuric acid in terms of the damages caused by acid rain. But the bill, including this title, imposes additional controls on nitrogen for reasons in addition to concerns over acid rain; namely, the role which it plays in the formation of ozone.

Ozone (O_3), better known as an ingredient in "smog", is the indicator for a variety of chemicals which are formed when the combination of nitrogen and organic chemicals (e.g. gasoline) are exposed to sunlight. Ozone is a powerful bleach, so effective at destroying organic matter that it is used by some cities to disinfect their drinking water supplies.

Although the chain of chemical reactions which leads to the formation of ozone and other oxidants is not completely understood, there is no disagreement that there are three essential ingredients. Without all three, ozone is not formed in substantial quantities. These are hydrocarbons, oxides of nitrogen, and sunlight. Historically, the Federal government has relied on a strategy of controlling ozone by controlling hydrocarbons emissions. This has achieved mixed results, leading some States to begin implementing a strategy based on controlling oxides of nitrogen. California has been the leading advocate of this approach and, according to State officials, has enjoyed considerable success.

Both ozone and acid aerosols pervade the atmosphere of eastern North America. Any one of them may pose a potent threat standing alone. But in combination, their impacts are multiplicative. This has been established in laboratory studies, but the extent to which these experiments represent the real environment in unclear. Nitrogen and its compounds, however, play a substantial role whether the specific problem being examined is acid rain, ozone, or the synergistic effects of the two.

The transport and dispersion of gases and particles over distances from tens to thousands of kilometers has been an active area of scientific study for many years. Even before the problem of acidic deposition had been recognized, research on how materials are carried by the winds was already extensive. This earlier body of work, together with more recent studies forms the basis for present efforts to understand the transport of acid-forming substances.

According to the 1987 Interim Assessment of the National Acid Precipitation Assessment Program, the major factors controlling transport and dispersion are the character and movements of meteorological systems. There are two extremes with a spectrum of variations in between:

(1) strong, fast-moving cyclones that have the potential to transport large amounts of pollutants rapidly across North America. Generally occurring in winter and spring, these systems bring with them strong horizontal winds, vertical wind shear, and widespread precipitation.

(2) Weak, slow-moving high pressure systems that allow sufficient time for slower-acting processes such as thorough mixing to take place. These systems occur more frequently in the summer and fall and are characterized by local convective storms, primarily near their periphery.

In the case of the storm systems, pollutants may move rapidly hundreds to thousands of kilometers downwind from their sources with limited removal. In the case of slower moving systems, pollutants are mixed vertically causing a buildup of concentrations. Figure II.1 shows the main storm tracks over North America. These paths represent the directions the predominantly winter storms would take, promoting strong flow conditions. In contrast, Figure II.1 shows stagnation days over the last 5 years.

As Figures II.1 and II.2 illustrate, whether the movement is rapid or slow, the transport of pollutants is a major determinant of local air quality. As a result, areas which ought to have quite satisfactory air quality, instead experience ambient levels of air pollution approaching, or even exceeding, those of industrialized areas. In some cases, such areas have aggressively implemented air pollution controls, risking the loss of industry to other regions or States. In others, the areas may have little or no industry and depend heavily on tourism or recreation, which may be threatened by the imported air pollution and its associated damage.

Finding

2. Current levels of air pollutants from existing sources as well as increased emissions from new and existing sources threaten

public health and welfare and the environment in States and countries other than those in which emitted.

Discussion

Even though the level of sulfur dioxide has declined from its historic highs in 1973, it is now at roughly the same level which prevailed from about 1915 to 1960. Emissions of oxides of nitrogen have declined slightly since 1970, but are 400 percent higher than in 1920. The declines have been slight to modest in comparison to overall levels, which continue to constitute a threat to human health and the environment. Indeed, as the science in this field has advanced, it has become clear that these are threats which have been realized in many areas, manifested by increased environmental damage, as well as elevated levels of morbidity and mortality.

Many of these damages fall most heavily on the residents and environments where the pollutants are emitted. But many others do not. This is especially true of acidic deposition because for oxides of sulfur and nitrogen to be transformed into sulfates and nitrates requires time and distance. These compounds often are deposited hundreds or even thousands of miles from the points where their precursors were emitted. Indeed, their impacts can fall most heavily on relatively pristine or rural areas which are only lightly industrialized. The States of Maine and Vermont as well as the Adirondack region of New York, suffer heavily from acid rain, even though they contain relatively few powerplants or other heavy industries.

Effects of acid rain.—The damage caused by acid rain is extensive. Although considerable debate exists about the extent of damage, a fair list of threatened subjects must include human health, aquatic life, forest damage, materials damage and impaired visibility. Given the interrelation of these elements, many damage assessments may underestimate the negative impact.

Human health.—Identifying the effects of the constituents and precursors of acid rain on human health is difficult. The mix of pollutants to which millions of Americans are regularly exposed is complex and changing. Individuals vary in sensitivity and relative health. Nonetheless, recent testimony received before the Subcommittee on Environmental Protection indicates that air pollution is a persistent health problem and that constituents and precursors of acid rain pose a major threat to human health.

The most significant human health research suggests that air pollution may play a role in increased human mortality. According to a recent study published by Harvard researcher Haluk Ozkaynak and related to the Subcommittee on Environmental Protection in testimony this spring, between two and four percent of the excess deaths in New York City are due to air pollution.

Ozkaynak et al. also found that on a national level, ambient levels of sulfates and fine particles were found to have a consistent association with higher mortality, ranging from between 3.4–6.9 excess deaths per year per 100,000 people per part per million. This translates into approximately 5 percent of annual excess mortality being associated with sulfate and fine particle pollution. Sulfates and fine particles represent the most respirable component of particle pollution and often contain the most toxic compounds. Due to their size, these particles reach deeper into the lung and are retained longer before they are cleared and swallowed.

The same researchers found that by using trace elements (e.g., vandium) from oil combustion a cross sectional mortality analysis was able to detemine the source of various types of pollution particles. Particles from coal combustion and the metals industry emerged as the most significant predictors of mortality. Both mortality and levels of the particles from these industries were elevated in the Ohio Valley-Midwest region of the United States.

Researchers at the National Bureau for Economic Research have estimated the impact of specific air pollutants on race specific neonatal mortality rates. According to the researchers:

> The results suggest that sulfur dioxide is the dominant air pollutant in newborn survival outcomes. There is also evidence that an increase in sulfur dioxide raises the neonatal mortality rate by raising the percentage of low-birth weight births. Based on marginal willingness to pay computations, we estimate that the benefits of a 10 percent reduction in sulfur dioxide levels range between $54 million and $1.09 billion in 1977 dollars.

The researchers note that the infant mortality rate is approximately equal to the mortality rate of 55 to 64 year olds.

Although the results cited above are still considered controversial, they do suggest the potential extent of the problem. In addition, testimony received before the Subcommittee on Environmental Protection on February 3, 1987, by four distinguished physicians, noted a number of well documented health effects.

Asthmatics, without other health problems, when exposed to levels of sulfur dioxide as low as 0.25 parts per million (ppm), for exposure periods as brief as five minutes during exercise, develop symptomatic and objective evidence of bronchial constriction, or a tightening of the airways. Short-term exposure to 0.3 ppm of nitrogen dioxide increases the incidence of exercise induced bronchospasm and airways hyper-reactivity in such asthmatic subjects. Acid air pollution is capable of producing pulmonary dysfunction, bronchial constriction and wheezing. These effects are exacerbated by exposure to cold air. At particular risk are children whose respiratory systems are less well developed and whose rates of ventilation are higher than adults. Also at risk is the sensitive population with hyper-reactive airways, thought to be approximately 15 percent to 20 percent of the general population. In addition, the elderly, whose respiratory systems may already suffer from underlying respiratory disease require special protection from acid air pollution. Symptoms present in these sensitive subpopulations may signal risks present in the greater population at large. Figure II.3 illustrates the population exposure to sulfates in the United States.

Respiratory disease and symptoms represent the largest and best documented category of health effects. However, evidence suggests that there may be indirect health effects linked to acid rain. Increased acidity in drinking water can mobilize heavy metals. In many older urban communities in the United States acidic water has the potential to dissolve lead, copper and aluminum contained in the pipes. The effects of exposure to these metals are well-known, ranging from headaches to possible death. A 1984 study by Taylor and Symons found that in 36 early morning samples of tap water in seven Northeastern States, 17 of the samples exceeded the Safe Drinking Water Act's Maximum Contaminant Level (MCL) for lead and 50 exceeded the standard for copper. Samples taken directly from surface water and ground water supplies did not show excess levels of lead and copper. This indicates the presence of corrosion products. The drinking water in Boston during the 1970s was found to have high levels of lead. Corrosion control treatment (lowering the pH levels) resulted in a decrease in lead levels. Although the pH of many community water systems such as Boston's is managed, these results suggest that increased acidity poses a potential health threat in urban areas and results in increased costs for municipal water systems.

In addition, in many rural areas the pH is not managed and water comes from a variety of sources. Surface water supplies and shallow wells in poorly buffered areas may be more affected by acidic deposition than in large urban communities. A study by the Tennessee Valley Authority (TVA) found that levels of lead, cadmium and mercury exceed the MCL for a certain percentage of each of these types of systems. Another TVA study showed that 16 percent of the households in rural areas within the TVA area had water that exceeded the MCL for lead. A 1984 study by Young and Sharpe in Pennsylvania found that in 70 percent of roof catchment cistern-supplied systems, the sediment water failed on one or more occasions to meet the MCL for lead or cadmium depending upon the conditions influencing the suspension of the sediment. Standing tap water samples from nine of 40 sampled systems showed that average concentrations exceeded current or proposed drinking water standards. There are approximately 133,000 individual roof catchment cistern systems in the Eastern United States. These systems are particularly susceptible to increased acidity and the related heavy metal concentrations since rain falls directly into them.

McDonald (1985) estimates that between 25,000 and 350,000 people in the rural Northeast may drink water exceeding the standard for lead, cadmium or mercury. Although the influence of acidic depositions on levels of these metals in drinking water is not firmly established, any increase in acidity is likely to result in increased corrosion and is thus a major source of concern.

The environment.—The best known environmental effect of acid rain is the damage to aquatic ecosystems. Fish populations decline concurrently with acidification. Fish reproduction requires pH levels above 4.5. Below a pH of 5, death of adult fish begins to occur. Figure II.4 shows the survival time of fish exposed to varying pH levels. More importantly, at pH levels near 6.0 many species which constitute key elements of the aquatic food chain disappear. Thus Schindler, et al has demonstrated effects to the food chain causing severe damage to the ecosystem at pH levels of 5.93 to 6.13. According to EPA's critical assessment review papers: "Biological effects due to acidification occur for a few species near pH 6.0. Because the biological response to acidification is a gradual one, continuing pH declines below pH 6.0 will result in escalating biological changes with many species adversely affected in the range of pH 5.0–5.5."

Species such as frogs and salamanders breed in pools formed from spring snowmelt water. Correlations between pH and amphibian mortality and embryo deformity have been observed. Shellfish are also especially sensitive to low pH values. Molluscs are unknown in waters below pH of 6.0. Figure II.5 shows the decrease in relative number of species as a function of acidity. Figure II.6 shows the percent of fish which survive in acidic waters.

Recently, a decline has been observed in the population of the black duck in the Atlantic flyway. Between 1955 and 1973, black duck populations declined by 50 percent, mallards declined by 35 percent, ringed neck ducks have declined by 79 percent and the common goldeneye by 54 percent. This decline has not been observed in three other flyways where acid deposition is less severe. The decline also occurred during the period of greatest emissions increase, 1955–1973. Researchers at Patuxent Wildlife Research Center found that the mortality of young black ducks raised on experimentally acidified wetlands may be increased by as much as three times the normal rate. Gastropods, a crucial element of the ducks food chain providing protein and calcium, do not survive in acidic waters with a pH of less than 6.0. Decreased protein has been shown to have a direct correlation with egg production. Captive mallards fed 50 percent less protein laid 50 percent less eggs. Although the decline of the black duck and similar species may be due to factors other than acid deposition, acid deposition emerges as a leading candidate of concern.

In addition to the damage caused by a long-term decrease in pH, the survival of fish in acidic waters is influenced by increased concentrations of pollutant in spring snowmelt. This phenomenon is referred to as "acid shock" or "acid pulse." Mass mortalities of fish have been observed due to increased concentrations of acidity and heavy metals mobilized by spring snowmelt. Because this phenomenon occurs during a vulnerable point in many species lifecycle, the damage may be especially severe.

Disappearance of fish from natural waters has been documented in the Northeastern United States. According to a 1984 report by OTA, in the Adirondack mountains, at least 180 former brook trout ponds will no longer support populations. A survey of 214 Adirondack lakes conducted in 1975 revealed that 52 percent had surface pH levels below 5.0 and that 90 percent of these lakes were entirely devoid of fish life.

According to the 1987 National Acid Precipitation Assessment Program (NAPAP), Interim Assessment, based on the National Surface Water Survey conducted by EPA, 5 percent of the lakes in Southern New England had pH levels less than 5.0, an additional 5 percent had pH levels between 5.0 and 5.5 and 15 percent of the lakes surveyed had pH levels between 5.5 and 6.0. The results for the Adirondacks show even more damage: 10 percent of the lakes had pH levels below 5.0, 10 percent had pH levels between 5.0 and 5.5 and 27 percent had pH levels between 5.5 and 6.0. In the Upper Peninsula of Michigan, 18 percent of the lakes had pH levels below 6.0.

A recent study by the Ontario Ministry of the Environment (Dillion, Reid et al., 1987) has documented a historic change in pH in Plastic Lake, Ontario, during the period 1979–1985. Direct observation and sampling of the lake indicated that a threefold decrease in alkalinity and a decrease of 0.2 pH units occurred during this period. Because the researchers noted a decline in organic acids of terrestrial origin, they conclude that decreased acidification and biological damage to Plastic Lake is dependent upon reductions in strong acid/SO_4 deposition. Based on chemical surveys, the study notes that Plastic Lake is typical of many thousands of lakes in Eastern North America. The study also states that: "The biota of Plastic lake have experienced major detrimental effects in the past eight years including fish kills, extinction or near extinction of mollusc species and amphipods, as well as proliferation of acidophilic filamentous algae."

Since aquatic population survival is clearly dependent upon acidity, the vulnerability of lake regions to acidification is used to assess and predict damage to aquatic populations. Because lakes are formed by relatively large watersheds, the largest amount of acid does not fall directly as rain into lakes and streams but passes over and through soil and bedrock before entering an aquatic resource. as nitric acid and sulfuric acid pass over soils and rock they are subject to a variety of reactions. The most important of these reactions are those that buffer the acidity. Surface topography plays an important role in the rate and frequency of these reactions. Steep mountain slopes allow little chance for buffering to take place. The ability of a lake and the surrounding soil to buffer acidity is frequently referred to as Acid Neutralizing Capacity or ANC. ANC is measured in microequivalents per liter of water or (ueql/1). A lake with a high capacity for acid neutralizing may have an ANC of 500 ueq/1.

Lakes with extremely low ANC (0–40 ueq/1) are considered "highly sensitive" to acid deposition, according to the Office of Technology Assessment (OTA). Regions with numerous lakes and streams of low ANC include the northeastern United States, Southeastern Canada, the upper Midwestern United States and mountain regions of the American West. Once the ANC of a lake is completely utilized the lake becomes incapable of further buffering and is considered "acidified." Figure II.7 shows areas of North America with low ANC.

OTA has estimated that in the Eastern United States approximately 3000 lakes and 23,000 miles of streams have already become acidified or have virtually no acid neutralizing capacity left. The Ontario Ministry of the Environment has estimated that of the approximately 50,000 lakes in eastern Canada, 20 percent are currently acid altered. OTA estimates that about 25 percent of the land area of the eastern United States is "sensitive," allowing the transport of acidity to lakes and streams. Based on this conclusion, OTA estimates that approximately 117,000 lakes and 112,000 miles of streams are vulnerable to acid rain. Figure. II.8 shows the number of aquatic resources at risk in the eastern United States.

Studies conducted by the U.S. Environmental Protection Agency (EPA) conclude that 19 percent of the lakes in the Northeastern United States have an ANC of less than 50 ueq/1 and that 60 percent of these lakes have an ANC of less than 200 ueq/1. 15 percent of the lakes in the upper midwest region are estimated to have a low ANC of less than 50 ueq/1. A survey of Western Lakes by the

EPA found that approximately 16.8 percent of the western lakes had low ANC of less than 50 ueq/1. Although these surveys are not complete (in fact the Western lakes survey was conducted during the fall when pH levels are the most stable) they do suggest that further damage to aquatic resources, both in the East and West, can be expected in the absence of further control.

Forest damage.—Recently, several cases of unexplained, regional scale forest decline have been observed throughout the United States. Reported forest declines include white pine in the Eastern United States, red spruce in the Appalachian mountains, yellow pine in the Southeastern United States and declines in Canadian sugar maple. In the San Bernardino mountains near Los Angeles, ozone has been unambiguously identified as the primary causal agent in forest decline, according to NAPAP. Ozone has also been determined to cause visible injury to sensitive genotypes of white pine throughout the Eastern United States. Although the greatest amount of current attention centers on ozone's role in forest decline, the effects of increased acidity of rain and increased levels of sulfur dioxide are also thought to contribute to forest decline. Because many of the more prominent cases of forest decline occur in above cloudbase forests, where ozone levels are high and the rainfall is highly acidic, the combined effects of acid rain and ozone are difficult to distinguish.

According to NAPAP, red spruce, located from sea level in Coastal Maine to 1500 meters in the Appalachian mountains, have experienced a decline beginning in the 1950s. Initially, according to NAPAP, the decline was only evident at high altitudes but more recently, growth reductions and foliar symptoms have been observed at low levels as well.

According to NAPAP, studies by Siccama et al. (1982) and Scott et al. (1984) show that the decline is the most severe at areas of high elevation; on Camel's Hump and Whiteface Mountain in the northeast, there has been a 30 percent to 70 percent decrease in live spruce since the mid-1960's. Declining spruce trees typically die back from the top of the tree downwards and from the outside of the tree inwards. These damage patterns are reversed for lower elevations along the Coast of Maine. These latter symptoms are similar to symptoms reported for Norway Spruce in Central Europe. Jagels (1986) examined spruce cores from sites off the Maine Coast and found that growth reductions and foliar symptoms were the most severe for sites within thin organic soils on granite bedrock. According to NAPAP, the author argues that these effects are remarkably similar to those observed in Central Europe where nutrient leaching on poor soils is strongly suspected.

Yellow Pine in the Southeastern United States has also experienced a widespread decline although no visible symptoms of damage are present. In Georgia, yellow pine stands on mountain sites were 25 percent to 50 percent as tall during 1972–1982 as during 1956–1961. Researchers express concern that chronic stress from ozone may be responsible for the reduction. Such a situation would have extraordinary economic implications for this major wood producing region of the country.

Crown dieback symptoms have also been reported for sugar maple in Southeastern Canada and in the Northeastern United

States. Sugar maple as a source of maple syrup also involves major economic concerns for these areas.

Although air pollution and acidic deposition are not yet fully confirmed as the primary causal agents responsible for most forest decline, studies conducted in the laboratory have shown acute and chronic injury in deciduous and coniferous seedlings and saplings when exposed to simulated "acid rain" solutions of pH less than 3.0. Chappelka and Chevone (1986) found that root growth in white ash seedlings was 12 percent less for seedlings exposed to simulated acid rain of pH 3.0 than for seedlings exposed to rain at a pH of 5.6. Raynal et al. (1982) observed that germination was inhibited for red maple and yellow birch seeds upon exposure to soil of pH 3.0. Exposure to SO_2 has been found to predispose plants to disease. Sulfur dioxide is readily absorbed by plants in both dry and wet forms and is dissolved inside the plant leaf to create sulfuric and nitric acids. These acids alter cellular biochemistry causing acute injury and death.

The effects of point source emissions of SO_2 on nearby forest ecosystems are well documented. Freer-Smith (1984) exposed various hardwood seedlings to sulfur dioxide concentrations of 100 parts per billion (ppb) for 104 hours per week for 60 weeks. A 20 to 50 percent reduction in total shootweight was observed. Such an exposure (a weekly average of 62 ppb) is well within the 100 to 200 ppb range which NAPAP estimates occurs near point sources and in urban areas. Ponderosa pine, after seven months of exposure to 150 ppb sulfur dioxide, exhibited pathological changes in mesophyll cells according to Karenlampi and Houpis (1986).

Exposure of red and jack pine to sulfur dioxide levels of 100 ppb for 40 hours per week for nine weeks resulted in a 10 to 20 reduction in height and growth according to Riding and Boyer (1983).

According to the Congressional Research Service, one estimate of the forest related damage by Crocker concludes that close to $1.75 billion (1978 dollars) in forest related damage occurs in the Eastern United States annually due to acidic precipitation. Crocker estimates the damage that would not occur under pristine conditions and includes losses from outdoor recreation, water storage and wildlife habitat as well as timber losses. A similar study by Callaway et al. estimated that if radial growth of forests were reduced by 10 to 20 percent annual losses would be approximately $340 to $510 million for the Adirondacks alone.

Materials damage.—Acid rain is known to cause materials damage. Among the materials affected are building stone, rubber, zinc, steel, leather, paint, and textile. Acid rain is thought to accelerate rust by as much as 30 percent. Acid rain contributes to premature soiling of paint and other materials. Two kinds of materials damage exist. Acid rain may damage culturally significant buildings and statuary. The effect of this damage is difficult to quantify, often irreplacable artifacts may be destroyed. Massachusetts estimates that it spends 13 million dollars per year refurbishing culturally significant buildings and statuary. A study by Callaway focusing on the maintenance costs for historically structures in 17 Eastern States estimated that between $22 million and $107 million is spent annually.

Acid rain may also damage replacable materials such as rubber and steel. Although these losses are potentially quantifiable, they too are difficult to estimate. In general, acid rain accelerates naturally occurring damage and is not the sole source of materials degradation. Still estimates of the cost savings available from a major reduction in sulfur dioxide emissions range into the billions of dollars. According to the Congressional Research Service, dollar values are placed on only a few common materials which may underestimate total materials damage.

According to Salmon, based on a study of 32 construction materials, (these 32 materials represent only 40 percent of construction materials exposed to air pollution) the nationwide cost for 1968 was $3.8 billion in damage due to air pollution. A 1974 paper issued by EPA estimated that the nationwide cost of air pollution damage to materials is approximately $2.2 billion annually. Ozone damage to rubber alone has been estimated to cost $395 million by Mueller and Stickney. Cleaning costs for households and for exterior paints have been estimated by Liu and Yu of EPA's Office of Research and Development to cost $36.2 billion annually. The effect of acidic deposition on materials in 17 midwestern and northwestern States was estimated to be close to $2 billion in 1984 dollars by Mathtech.

Visibility damage.—Emissions of SO_2 and NO_x contribute to visibility impairment. Sulfates and nitrates that do not fall to the earth as acid rain remain suspended in the air scattering light and creating regional haze. Visibility impairment is frequently perceived of as a surrogate for air quality. Visibility impairment has a negative aesthetic impact, particularly in national parks, and an impact on transportation operations, especially air traffic. Visibility is generally worse in the summer than in the winter.

Extensive data exists on visibility in the form of visual range estimates made by trained observers at airport weather stations. Based on this data the National Academy of Sciences has concluded that: "It is now well established that, on average, sulfates and associated water account for about 50 percent of visibility reduction in the East, slightly less in urban areas, but somewhat greater in nonurban areas." According to NAS, one study indicated that sulfates and associated water in nonurban areas accounted for approximately 75 percent of the light extinction.

According to NAS, the area of greatest light extinction (worst visibility) occurs east of the Mississippi and south of the Great Lakes. This area also corresponds to some of the worst air quality in the country. Figure II.9 shows the median annual visual range distribution for the United States in 1976.

Visibility is a major issue in the national parks. Air pollution in the Grand Canyon impairs visibility approximately 100 days per year. Studies by the National Park Service have determined that sources as distant as 300 miles contribute significantly to air quality degradation in some parks. Air quality is endangered in approximately one-half of the national parks. Visual range in the eastern United States, including in national parks, such as the Shenandoah, is frequently less than 15 miles.

Estimating the costs of decreased visibility is difficult. Latimer, et al have estimated that the value of good visibility is approximately 2 dollars per person per year. Based on this assumption, a

13 percent increase in visibility is worth approximately 4.2 billion dollars.

A study funded by the Electric Power Research institute examined the value to visitors of improving visibility at the Mesa Verde National Park and the Smokey Mountain National Park. The study concluded that total annual benefits to be derived from increased visibility at the Smokey Mountain National Park ranged as high as 8.5 to 10.5 million dollars.

Sources of acid rain.—According to the National Acid Precipitation Assessment Program, best estimates of man-made emissions in 1980 in the United States (in million metric tons) are: 24.5 for sulfur dioxide; 20.7 for nitrogen oxides; and 21.4 for volatile organic compounds. For Canada, the best estimates for 1980 (in million metric tons) are: 4.6 (4-5) for sulfur dioxide; 1.9 (1.5-2.4) for nitrogen oxides; and 2.7 (2-4) for volatile organic compounds.

Emission sources in 1980.—In 1980, major U.S. sources of sulfur dioxide included electric utilities (65 percent), industrial combustion (13 percent), industrial processes (13 percent), and residential, commercial, and other sources (9 percent). Sources of nitrogen oxides were highway vehicles (35 percent), other transportation activity (10 percent), electric utilities (28 percent) industrial fuel combustion (19 percent), and others (8 percent). Sources of volatile organic compounds emissions were transportation activity (38 percent), industrial processes (27 percent), fuel combustion (12 percent), petroleum-product storage and marketing (7 percent), and others (16 percent). In Canada, the major source of sulfur dioxide emissions is nonferrous smelting, and the major sources of nitrogen oxides and volatile organic compounds are similar to those in the United States.

Contribution of electric utilities.—Electric utilities have become a major souce of sulfur dioxide and nitrogen oxides emissions in the United States since 1960; in earlier years, sources were smaller and more dispersed. Today, sources of sulfur dioxide are generally large and centralized and emit from fairly high stacks at high temperatures and exit velocities. More than 90 percent of the sulfur dioxide emissions from power plants come from older facilities, which are generally regulated less stringently than plants under the new source performance standards of the Clean Air Act.

Coal combustion has been the largest source of sulfur dioxide emissions in the United States throughout the period from 1900 to today. However, coal-fired power plants have only recently become a major contributor of sulfur dioxide. Until about 1960, most coal combustion occurred in manufacturing facilties, residences, commercial establishments, and locomotives. Figure 10 shows historical trends in sulfur dioxide emissions by source.

The shift from the use of coal in small, dispersed sources to its use in large power plants is significant to acidic deposition studies because it indicates that emissions released higher into the atmosphere and at higher flue-gas temperatures and exit velocities have become dominant over the last 25 years. The stack-height estimates in the NAPAP Emissions Inventory give the following sufur dioxide emissioins percentages for 1980.

Stack-Height Range (meters):	Percent
0–37	19
37–73	13
73–146	30
>146	38

The stack height for a typical, new, large coal-fired power plant would generally fall into the >146-meter catgory.* (Very tall stacks—on the order of 200–300 meters—were used in the 1970's to reduce the local air quality impact of emissions.

Sources of Nitrogen Oxides and Volatile Organic Compounds.—Both large sources (primarily powerplants) and small sources (e.g., motor vehicles) contribute significant portions of national nitrogen oxides emissions. Almost 70 percent of the nitrogen oxides are emitted at levels below 37 meters. New powerplants are controlled to a somewhat greater extent than older powerplants in terms of emissions of nitrogen oxides per unit of fuel. Sources of volatile organic compounds emissions are generally small and dispersed and emit at ground level.

TRENDS IN MAN-MADE EMISSIONS

Sulfur Dioxide

Between 1980 and 1985, man-made sulfur dioxide emissions in the contiguous United States are estimated by National Acid Precipitation Assessment program to have dropped by about 2.5 million metric tons (to 22 million metric tons in 1985). The estimated peak in this century was about 30 million metric tons in 1973. These appear to be statistically significant decreases, because recent trends in sulfur dioxide emissions from powerplants can be estimated fairly accurately—to within a few percent—and a large portion of the estimated reduction in sulfur dioxide emissions in recent years is due to decreases from powerplants. Emission reductions from nonferrous smelters in the West also account for a large portion of the total national sulfur dioxide decrease since 1973. The decline after 1973 resulted primarily from regulations directed at powerplants that were issued subsequent to the enactment of the Clean Air Act. In addition, competitive prices for low-sulfur coal and decreased use of some powerplants with high emission rates contributed to the reduction in sulfur dioxide from powerplants.

Long-range historical estimates from NAPAP indicate that annual man-made sulfur dioxide emissions in the United States were about 9 million metric tons at the turn of the century and then increased rapidly to 21 million metric tons in the late 1920's. This was followed by a sharp decline (>30 percent) during the early part of the depression of the 1930's, a large increase (75 percent) from 1932 to 1944 (including the period during World War II), a decline (>20 percent) after the War, and a rise (>50 percent) during the industrialization and increased coal use that occurred between 1955 and 1973. The estimated emission value for 1985 is slightly higher than the value for the late 1920's.

Emissions of volatile organic compounds are also estimated by the NAPAP to have risen in the United States between 1940 (17 million metric tons) and 1970 (26 million metric tons), but the estimates show a net decrease of over 20 percent between 1970 and 1985, primarily because of implementation of controls on automobiles. Emissions of volatile organic compounds in 1985 are estimated of about 20 million metric tons.

A major purpose of this bill is to protect the environment of the States with sensitive resources from the predations of their polluting neighbors by compelling pollution reductions which are adequate to attain and maintain the levels of air and water quality which the receptor States choose. Hopefully, the lessened loadings which result from the tonnage reductions of 4 and 12 million tons of oxides of nitrogen and sulfur respectively, combined with the other explicit requirements (e.g. the individual powerplant emission and lifetime limits), will achieve these levels of protection. In areas which are more sensitive or protected, however, it is likely that additional controls will be required and, therefore, imposed.

Finding

3. Reduction of total regional atmospheric loading of pollutants such as sulfur oxides and nitrogen oxides will enhance protection of public health and welfare and the environment.

Discussion

By relying on States and, through them, air quality control regions, the Clean Air Act has achieved admirable reductions in air pollution in many urban areas of the United States. Such localized control programs will not, however, adequately protect health and the environment from pollutants which are transported and transformed, such as oxides of sulfur and nitrogen and ozone. Indeed, the emphasis on localized ambient levels and control programs has been a major contributor to the continental and subcontinental scale threats now posed. To adequately cope with these threats requires emission reductions which will lower regional, perhaps national, loadings of air pollutants. This is a major research for including the entire United States in the reduction program.

Moreover, if those scientists who believe that oxidants and some other pollutants (perhaps including even carbon monoxide) play a controlling role in the transformation of oxides of sulfur and nitrogen prove to be correct, it will be necessary to impose control programs for those emissions as well.

LINEARITY

One important issue related to transport is the linearity of the relationship between emissions and deposition. Because of the variety of deposition methods and the effect of atmospheric chemistry and transport, suggestions have been made that there may not be a linear correlation between emissions and deposition.

This counter-intuitive view remains unsupported. The National Academy of Sciences (NAS) has concluded "there is no evidence for a strong nonlinearity in the relationships between long-term average emissions and deposition." Because reactions with NO_x take place rapidly and efficiently, NAS concluded that any nonlinearity would be a function of SO_2 emissions alone and would therefore reveal itself in a difference betwen the regional deposition ration of NO_x and SO_2. Since the percentage of deposition for both precursors is approximately equal, locally as well as when transported, NAS concluded that, "It is therefore improvable that the oxidation of SO_2 is sufficiently hindered by a lack of oxidant to cause a disproportionally small reduction in precipitation as a result of a given reduction in SO_2 emissions."

On the contrary, evidence collected by the National Acid Precipitation Assessment Program suggests that reductions in total regional emissions will lead to comparable or nearly comparable reductions in ambient levels.

The 1987 Assessment concluded that in the eastern United States sulfate aerosol is more uniformly distributed than sulfur dioxide, and reported the following:

> High concentrations of sulfate aerosol can build up in stagnating air masses as sulfur dioxide is converted to sulfate aerosol (SIC). During a sulfate episode, high sulfate aerosol concentrations may exist over large areas and persist for several days. Sulfate episode conditions on a regional scale occurred about one-fifth of the time in the Northeastern United States during the EPRI-SURE study.

The Assessment did not directly confront the validity of the findings contained in the 1986 NAS/NRC report *Acid Deposition Long Term Trends* cited earlier. However, the Assessment did state that NAS/NRC conclusions were consistent with the extensive work undertaken by NAPAP, as well as that of other researchers. Specifically, the NAPAP Assessment said the following:

> The qualitative interpretation of tendencies given in the National Research Council report is consistent with the results of the more quantitative analyses. . . . A highly probable, but not yet verified, explanation for the decrease in sulfate concentrations is the very similar trend in sulfur dioxide emissions in the eastern United States.

It may not be possible during the foreseeable future to conclusively demonstrate whether the relation between emissions and deposition is linear (or nearly so) or non-linear. However, the convergence of different lines of evidence combined with the nearly total absence of other evidence to the contrary suggest that the relationship is linear or very close to it. Given the fact that the accumulation of evidence has strengthened the credibility of the NAS/NRC conclusions, some of the most relevant of them bear repeating:

1. There is a strong association between emissions densities of SO_2, concentrations of sulfate aerosol, visibility ranges, wet precipitation concentrations of sulfate and sulfate fluxes in studied streams.
2. Since the 1920's SO_2 in the Northeastern United States has fluctuated at or near current levels.
3. Regional differences over time in amounts of SO_2 emissions did not appear until about 1970. Since that time, evidence of deposition indicates that greatest rates of increase have been in the Southeast, with somewhat lower increases in the Midwest and slight decreases in the Northeast.
4. Changes in stream sulfate were, on a regional basis, consistent with changes in SO_2 emissions.

5. Data on some lakes suggest that changes in their alkalinity have occurred during the past 50 years, but these are too great to have been caused by increases or decreases in acid deposition alone. They most likely resulted from other human or natural activities (e.g. changes in land use).

In summary, there is every indication, from all available evidence, that reducing emissions on a regional scale will reduce acid deposition on a regional scale on a one-to-one basis, or something close to it.

Finding

4. More effective regulation of the interstate transport of air pollutants is needed in order to protect the health and welfare of the citizens of downwind States and the economic growth opportunities of downwind States.

Discussion

The current Clean Air Act was written at a time when the interstate transport of air pollution was not widely acknowledged. Indeed, it was the implementation of the Clean Air Act which created a substantial number of the interstate pollution problems. Rather than reducing their emissions of sulfur dioxide, electric utilities proposed the use of "tall stacks" to inject pollution into the upper atmosphere where it could be diluted and transported over long distances. Although illegal, this policy was expressly approved by the first Administrator of the Environmental Protection Agency, William D. Ruckelshaus, and quickly lead to the widespread use of super-tall smokestacks.

Although the Congress enacted curbs on the use of tall stacks in the 1977 amendments to the Clean Air Act, the regulations were not issued until 1987 and, even now, are tied up in litigation. In addition, the Congress enacted a new section 126 expressly to control interstate air pollution. But this too has largely failed to achieve the congressionally intended goal of curbing and controlling interstate air pollution. Thus, the law remains today largely what it was when written in 1970, keyed almost entirely to achieving local ambient air quality standards.

Some have suggested that the existing law is adequate to deal with interstate air pollution. The most persuasive argument that it is not, is the EPA's own analysis of the options available under existing law. This analysis was prepared by Agency staff in 1983 at the instruction of William D. Ruckelshaus, who at that time had just been reappointed to the post of Administrator. The following are excerpts from that analysis:

> EPA could take several regulatory and policy steps under the existing Clean Air Act to obtain both further information on and reductions in SO_2 and NO_2 (or total sulfur and total reacted nitrogen). Preliminary examination of these steps raises questions regarding the costs of control and administration, disruption or possible distortion of the current ambient air quality program, impacts on coal miners, equity, timing and effectiveness. However, some steps appear worthy of further evaluation, while

others could serve to reinforce certain steps by helping to assure that their intended effects were fully realized in practice, as explained below.

Several issues are raised by more intensive use of existing authority.

First, existing authority (even for dealing with interstate impacts) is almost entirely keyed to achieving ambient air quality standards. Accordingly, tightening existing procedures (e.g. modeling) to effectively tighten emission limits, would likely be met with requests for SIP relaxations or other resistance based on assertions that tightening is not needed to meet the NAAQS. Further, emissions trading keyed to meeting NAAQS is constrained to small geographic areas (e.g. several miles or less for SO_2) relative to the statewide, interstate or interregional trading that would be consistent with a total loadings approach as envisioned by several acid rain bills in Congress. A larger trading area would allow more sources with greater variation in pollution reduction costs to trade, with greater savings potential.

Second, tightening existing procedures may affect the flexibility and credibility of the current air program, since it will impose yet another reduction requirement in areas widely believed to have attained ambient standards. Such tightening will also require a shift from well debated policies and practices established over a number of years. It may also be difficult to tighten selectively. For example, tightened modeling procedures may eventually have to be applied to all areas of the country, all pollutants and/or all types of sources—without regard for their effect on total loadings or efficient administration.

Third, any substantial reduction produced by more intensive use of existing authority may have significant effects on unemployment, as eastern powerplants shift from local high sulfur fuel to lower sulfur coal from western mines. EPA may be in a much less defensible position where these reductions are sought through creative use of existing authority, than where Congress clearly mandates reductions beyond those required to meet local ambient air quality concerns. For example, an unresolved section 125 petition (to require use of only local coal) from the state of Ohio could impede any EPA efforts requiring a shift to lower sulfur coal.

Finally, any use of existing authority should consider the sources affected to determine whether they might soon be revisited under new deposition authority in ways that would render compliance efforts obsolete.

Despite these caveats, there are steps which appear preliminarily capable of securing significant additional reductions. To the extent, however, that these steps are perceived as disruptive departures from past air program management, many States and sources could be expected to resist their application resulting at the very least in substantial delays in making them effective.

> Within these limitations [EPA could] . . .
>
> Use Clean Air Act section 114 to require all existing powerplants which burn over over 250 million Btu per hour to install continuous emission monitors to meet current emission limits . . .
>
> Require use of 24-hour averages for enforcement in Ohio and Indiana, instead of thirty day rolling averages . . .
>
> Use section 115 of the Clean Air Act, which is not limited to meeting the NAAQS, to require SIP tightenings for sources that "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country" . . .
>
> Require stricter air quality modeling . . .
>
> Add a stringent 3 hour SO_2 compliance averaging time to Continuous Emission Monitoring
>
> Use New Source policies to encourage turnover of existing sources or to obtain further reductions through stricter technology determinations . . .
>
> Require extra reductions from existing source emission trades . . .
>
> Revise the ambient standards . . .

Within the context of current law, some States choose to stringently regulate levels of air pollution solely to protect their environment. Others choose to do so in order to preserve room for future economic growth. In either event, to protect these legitimate State interests requires a regulatory program which recognizes and minimizes interstate transport of air pollutants, regardless of their identities.

Although most attention in the acid rain debate has focused on the transport of pollutants from industrialized areas such as the Midwest to sensitive and lightly-developed areas such as New England and Canada, this scarcely describes the universe of problems. Consumption of the PSD increment in one State by pollutants originating elsewhere also requires protection, as does pollution originating in one State which causes ambient levels in another to exceed the primary or secondary standards. To preserve these environments, and growth opportunities, requires uniform regulation and technologies, which is another of the overriding purposes of this bill and title.

Finding

5. In particular—

(A) the deposition of acid compounds from the atmosphere is causing and contributing to widespread long-term ecosystem degradation;

(B) the principal source of the acid compounds in the atmosphere, and their precursor, is the combustion of fossil fuels;

(C) the problem of acid deposition is of national and international significance and cannot be addressed adequately without Federal intervention;

(D) control strategies and technology for precursors to acid deposition exist now that are economically feasible; and

(E) current and future generations of Americans will be more adversely affected by delayed action, so that efforts to remedy the problem should commence now.

Discussion

This finding is a particularized and more explicit restatement of the first four findings which have already been discussed. Not discussed earlier, however, is the widespread availability of strategies and technologies to reduce acid rain and its precursors. There is no question that this program could be implemented in a cost-effective way with current technologies and strategies with little or no delay. Other technologies are being developed and almost certainly will become increasingly available. Those which are currently available, taking into account both technical feasibility and costs (operating as well as capital) include those described below.

A variety of strategies and technologies exist for controlling emissions of SO_2 and NO_x. Three primary types of control methods exist: pre-combustion techniques, combustion technologies and post-combustion technologies. Some control methods can be used jointly or in combination with other methods. Control methods vary in their applicability at different plants. Some control methods can only be utilized at new plants, while others are suitable for retrofit at existing plants as well as for use at new plants.

Precombustion Technologies.—Precombustion techniques attempt to reduce the amount of sulfur or nitrogen present in the fuel prior to combustion. This is done either through technological means or through selection of fuel naturally low in sulfur and nitrogen content. Precombustion techniques work well in combination with other technologies and require less plant modification.

One simple method of reducing SO_2 emissions is to substitute other fuels, such as oil or natural gas, or to use lower sulfur coal. Sulfur content among coals ranges from 0.3 percent sulfur to 6 percent sulfur. When burned, coal emits between 0.4 lbs per million btu (Lbs/MMBtu) and 12 lbs/MMBtu. Low sulfur coal is coal with a sulfur content below 1.0 percent sulfur or coal which, when burned, emits less than 1.2 Lbs-MMBtu. Low sulfur coal is found both in the Eastern and Western United States, although Western coal is generally low sulfur and Eastern coal is more frequently of the high-sulfur variety.

Use of low-sulfur coal, also referred to as fuel switching, does not represent a complete strategy for substantial emission reductions. Because the largest amount of low-sulfur coal is located in the West, the cost of transporting large amounts of coal makes widespread fuel switching in the East impracticable. Large-scale fuel switching would also impact unfavorably on the eastern high-sulfur coal industry.

A slightly more technologically advanced precombustion technique is coal washing. Coal contains sulfur in two forms, pyritic sulfur and organic sulfur. Pyritic sulfur is the discrete mineral contained in coal and unlike organic sulfur, can be removed through physical separating processes. Thirty to seventy percent of the sulfur in coal may be in pyritic form. Coal washing can remove up to 40 percent of the pyritic sulfur in coal depending upon the original sulfur content of the coal. Coal washing is achieved through crushing the coal and then separating out the different particles based on their specific gravity in water.

Although washed coal has a higher Btu content, less sulfur and reduced ash, coal washing is most economical with high-sulfur coals and by itself is capable of achieving only moderate amounts of emission control. According to EPA, on a cost per ton basis, coal cleaning is only sightly more cost effective than wet scrubbing. Still, coal cleaning represents an intermediate control option and can be easily used in conjunction with other control technologies.

Methods for chemical coal cleaning which could remove the organic sulfur are still under development. These methods include, microwave desulfurization, hydrothermal desulfurization and electron beam cleaning. Although these technologies are still years away from the commercialization stage, they do represent promising precombustion alternatives. These techniques are expected to remove up to 90 percent of the total sulfur in coal.

Coal can also be liquified or gasified. In addition to facilitating transportation, liquification and gasification can reduce sulfur content as well. Gasification can result in a 95 percent removal of sulfur. Liquification, in combination with other processes, can result in 70 percent to 90 percent removal of sulfur. Liquification is achieved through two process methods, "indirect" and "direct" hydrogenation. In indirect hyrdrogenation, coal is converted to gaseous carbon monoxide, hydrogen and methane and is then converted to a liquid through catalytic conversion. During direct hydrogenation, a solvent is used to liquify pulverized coal which is then processed into a fuel similar to oil, which is further refined through a process known as "cracking" to produce a variety of fuels. This process, also known as solvent refined coal, is effective on a variety of coals and results in removal of all pyritic sulfur and 65–70 percent of the organic sulfur. Both liquification and gasification can result in production of toxic substances during the processing.

One extremely promising technology which utilizes coal gasification is the Integrated Gasification Combined Cycle plant. Coal is gasified at the plant and sulfur and particulates are removed. The gas is then combusted in a gas turbine to produce electricity. Hot exhaust gases are recirculated to produce steam for another turbine which generates electricity. This technology is being demonstrated by Southern California Edison and Texaco at the Cool Water Plant. A five-year demonstration project is now halfway complete. Emissions of SO_2 have been reduced by rates up to better than 99 percent. The sulfur which is removed during gasification is sold as 99.5 percent pure elemental sulfur.

Combustion Technologies.—Combustion technologies attempt to burn coal in new ways which produce less pollution. Combustion technologies are generally not yet commercially available but are expected to represent the future of coal-fired boilers.

Two promising combustion techniques for SO_2 removal are the Limestone Injection Multistage Burner (LIMB) and fLuidized Bed Combustion (FBC). Both technologies utilize significant amounts of crushed limestone or dolomite during the combustion process to react with sulfur dioxide to form calcium sulfate which is then physically removed form the boiler. During the LIMB process, limestone is injected into the boiler during combustion. When used in combination with Low NO_x burners, EPA estimates that 70 percent NO_x control and 50 percent SO_x control is possible.

Two types of fluidized bed combustion exist, atmospheric and pressurized. In both types, limestone or dolomite is held in suspension by jets of air. This suspended limestone is the "fluidized bed" into which crushed coal is fed and then burned. In atmospheric FBC, the combustion chamber is kept at atmospheric pressure. In pressurized FBC, the combustion chamber is pressurized to between 6 and 16 times atmospheric pressure.

Although FBC has not yet been commercially demonstrated, an atmospheric fluidized bed combustion process has been retrofitted on a 125 megawatt boiler at Northern States Power's Black Dog Generating Plant. Emissions data from a smaller plant located in West Virginia indicate that atmospheric FBC can achieve an 85-89 percent removal of sulfur during combustion.

Pressurized FBC has not yet been commercially demonstrated either. It is expected that pressurized FBC will require smaller amounts of limestone and result in greater emissions reductions.

One combustion process for decreasing emissions of NO_x is staged combustion or low NO_x burners. During combustion, NO_x is formed in two ways: first, nitrogen present in the fuel oxidizes during combustion, second, nitrogen present in the air oxidizes from the heat of the combustion process creating "thermal" NO_x. Thermal NO_x comprises approximately 20-40 percent of all nitrogen oxides produced from a coal fired boiler. During the first stage of staged combustion, thermal NO_x is kept to a minimum by burning a fuel rich mixture which incompletely burns the fuel in the presence of relatively small amounts of air. More air is added at later stages to completely combust the air. Low NO_x burners in retrofit applications can reduce NO_x emissions by 50 percent.

Postcombustion Technologies.—Postcombustion processes remove emissions from the smokestack before they are released into the atmosphere. Postcombustion processes are reliable and have been commercially demonstrated at thousands of plants across the world. As of January, 1987, 142 flue gas desulfurization units (FGD) were in operation in the United States with 34 more planned and 15 more under construction.

FGD units, also known as scrubbers, work through the reaction of exhaust fumes with lime or limestone. Wet scrubbers spray limestone dissolved in water through the exhaust gases to convert exhaust gases into calcium sulfite and calcium sulfate. Wet scrubbers can remove 90-95 percent of the sulfur dioxide formed in combustion. Dry scrubbers which do not utilize water can achieve a removal of 70 to 90 percent of the SO_2 formed during combustion.

Although the United States has lead the world in the development of some air pollution control technologies, other countries have more aggressively developed and implemented controls for oxides of nitrogen. Flue gas treatments for NO_x control have been widely used in Japan. The most promising is Selective Catalytic Reduction, (SRC) which uses ammonia to catalytically reduce NO_x emissions by up to 90 percent. Although the original ammonia injection process for control of NO_x was developed in the United States, the first applications were in Japan, beginning in 1974, because of the more stringent standards there.

To date, SCR has now been applied to more than 100 units in Japan, with several commercial facilities and about 50 pilot plants installed in West Germany as well. Other nations utilizing SCR include Sweden and Austria, as well as the State of California.

Although the utility industry has estimated that the cost of SCR application would exceed $1,500 per ton of NO_x removed, these estimates assumed relatively low efficiencies, shorter catalyst life, and higher catalyst costs. Estimates by major suppliers, based on actual experience at Japan and German installations, are that the cost per ton would be about $725 if SCR were the only means of control. When combined with low-NO_x burners, the costs are reduced to $530 per ton and $350 per ton for emissions of NO_x concentrations of 500 ppm and 800 ppm respectively. Such costs are reasonable for an available technology such as SCR, especially taking into account the degree to which NO_x emissions from motor vehicles are being controlled. Moreover, as the requirements of this bill are implemented, resulting in more extensive use of SCR for new and existing facilities, the costs per ton should drop even further.

The SCR process uses ammonia gas, injected into the flue gas to selectively reduce NO_x over the surface of a catalyst to molecular nitrogen and water. This reaction takes place in the range of 300°C to 400°C.

The major equipment required for an SCR system is a catalytic reactor. A typical SCR catalyst is composed of vanadium and tungsten oxides supported on a porous titanium dioxide carrier. The catalyst is usually in the form of a honeycomb.

SCR has been operating on Japanese utilities for 13 years in oil and gas-fired units and 7 years in coal-fired units. After the first few years with some start-up problems, these facilities have operated in a trouble-free manner and, in fact, some gas-fired boilers have been operating with their initial catalyst charge for more than 10 years. Development of SCR for coal-fired boilers began in the late 1970's and is reaching the same quality of operation in Japan today. Some coal units have operated satisfactorily for 6 years with their initial catalyst charge. Variable combustion streams for some coal make catalyst poisoning a problem for SCR application to coal.

Widespread commercialization of SCR technology on powerplants in the U.S. is awaiting stricter NO_x emission standards of the sort that may result from this bill. Areas of California currently have stringent NO_x standards. Here, SCR technology is widely used commercially to reduce NO_x from industrial boilers, refinery heaters, stationary engines, and gas turbines. However, the scale of operations is typically considerably smaller than required by electrical utilities.

SCR units has been installed on gas-, oil-, or coal-fired facilities in Germany and Japan. For coal-fired boilers in the United States, it is expected that the introduction of the technology may require limited pilot plant testing, as was the case in Germany. This would provide U.S. engineering companies the information and practical experience to base necessary SCR reactor sizing under U.S. conditions.

Because of recent developments in technology, SCR catalysts have improved in efficiency and durability, thus improving the technology's economics. In addition, in areas where SCR technology has been widely adopted, competitive forces have lowered catalyst prices significantly.

Purpose

1. To protect public health and welfare and the environment from any actual or potential adverse effect caused by ambient concentrations or deposition of air pollutants, including the products of atmospheric transformation of pollutants.

Discussion

The purpose of these and the related provisions of the bill is to protect against all actual or potential adverse effects. Because of the wide range of effects which acid forming compounds and other air pollutants can have, it is not possible to enumerate, much less anticipate, what these might include. The effects may manifest themselves in direct and unambiguous ways, or they may be more subtle and difficult to detect. They may be a result of the presence of a pollutant in the ambient air or a result of its entering terrestrial, aquatic or biological systems, some of which may be especially sensitive. This part and its related provisions is to be implemented and construed so as to guard against all of these consequences and threats.

These provisions are to be implemented and construed in a precautionary way, protecting health, welfare and the environment in such a fashion as to provide a margin of safety against error, miscalculation, or scientific uncertainty.

Purpose

2. To preserve the rights and responsibilities of States to protect the public health and welfare and the environment of their citizens from air pollution originating in other States.

While the primary purpose of this part and related provisions of the bill is to establish a regulatory program at the Federal level (parts of which may be implemented by State or local governments), it is also to enable States to protect their own environments, and citizens, to the degree they deem appropriate. Some States may choose to implement regulatory programs which, although consistent with the requirements of this bill, are somewhat less stringent than those of other States. They may not do so, however, if the impacts fall on the health, welfare or environment of another State. Upwind States must safeguard the interests of other States to the same extent and to the same degree that the downwind States would require if the pollution were originating within their own borders. This part, and the bill, require that adequacy of a control program be measured not only against the requirements imposed by the host State, but against those which would be imposed by an affected State.

TONNAGE REDUCTION GOAL

Summary

Section 181 provides that a reduction in annual emissions of sulfur dioxide of not less than 12 million tons be achieved by Janaury 1, 2000, with intermediate reductions of not less than 5 million tons and not less than 10 million tons to be achieved by January 1, 1993 and January 1, 1998, respectively. The section also provides that a reduction in annual emissions of oxides of nitrogen of not less than 4 million tons be achieved by January 1, 1996.

Discussion

This section establishes the fundamental goal for reductions of oxides of nitrogen and sulfur dioxide which are implemented by other provisions of this new part and the bill. The mandated emissions reductions are measured against the baseline of actual emissions during the calendar year which began on January 1, 1980, and ended December 31, 1980.

ACID PRECURSOR CONTROLS

Summary

New Section 182 imposes explicit requirements, the implementation of which should achieve the reduction targets of 12 million tons of sulfur dioxide and 4 million tons of oxides of nitrogen. Subsection (a) requires each State to achieve a statewide average among all major stationary sources which are fossil fuel fired steam generating units (including both utility and nonutility units) that were in operation during all or part of 1980, a sulfur dioxide emissions rate of not more than 0.9 pounds per million British thermal units (Btu) of heat input. This annual average must be achieved by January 1, 1998.

Each State must also achieve by January 1, 1996, a Statewide average emissions rate among all such sources for emissions of oxides of nitrogen. This composite rate is based on average annual emissions rates of 1.0 pounds per million British thermal units for cyclone boilers, 0.5 pounds per million Btu for wall-fired boilers and 0.4 pounds per million Btu for tangential-fired and other boilers, in the proportion that such boilers are of the total boiler capacity of such State.

Subsection (b) requires that States adopt or otherwise impose a variety of enforceable measures to assure that the emission reduction goals established in section 181 and that the explicit Statewide average emission rates established by subsection (a) are achieved. Pursuant to subsection (b)(1), within 2 years of enactment a State must adopt enforceable measures which are adequate to achieve the reductions required by subsection (a). The measures, like subsection (a), must apply to each source subject to subsection (a), and include emissions limitations and schedules of compliance, as well as additional means of emission reduction in accordance with section 184 (relating to enforceable emission reduction programs).

Pursuant to subsection (b)(1), within two years of enactment a State also must adopt enforceable measures as are necessary to achieve within its borders a reduction in annual emissions below the level of such emissions during calendar year 1980, of sulfur dioxide equal to that fraction of 12 million tons that is the ratio of all the actual utility emissions in such State in excess of 0.9 pounds of sulfur dioxide per million Btu of heat input during calendar year 1980 (where such excess utility emissions in such State exceed 1,000 tons) to the total in all States of all the actual utility emissions in excess of 0.9 pounds of sulfur dioxide per million Btu of heat input during calendar year 1980.

Such additional measures must achieve for each State: (i) its fraction of five million tons of such 12 million tons not later than January 1, 1993; and (ii) its fraction of ten million tons of such twelve million tons not later than January 1, 1998; and (iii) its fraction of the total 12 million tons not later than January 1, 2000. The enforceable measures shall include, at a minimum, emission limitations and schedules of compliance for each source.

The Governor of each State shall submit such measures to the Administrator of the Environmental Protection Agency for review in accordance with paragraph (2).

The Administrator shall approve within six months such measures submitted under the preceding paragraph if the Administrator finds that such measures: (A) contain enforceable requirements for continuous emission reduction, including for each source, limitations on emission rate, assumed rates of operation, and limitations on aggregate annual emissions consistent with such assumed rates of operation; (B) contain requirements for the installation and operation of continuous emission monitoring by the source and additional monitoring by enforcement agencies to assure that the emissions limitations are being met; and (C) are adequate to achieve the reduction in emissions for such State required by this section within the time specified.

Each emission limitation, schedule for compliance or other measure adopted and approved under this section shall be deemed a requirement of the State implementation plan approved or promulgated for such State under section 110 of the Clean Air Act.

Not later than 3 years after enactment, the owner or operator of each stationary source subject to an emission limitation under this part must certify to the State the means by which such source intends to comply with such emission limitation, identifying the extent to which it will rely on fuel substitution, installation of a system of continuous emission reduction, retirement of existing facilities, implementation of energy conservation measures, or a combination thereof.

Not later than 5 years after enactment, each stationary source (i) for which certification is not provided within three years or (ii) that certifies that it will comply with an emission limitation established under this subsection or section 183 (relating to default requirements and special rule for growth) in whole or part through fuel substitution shall be in compliance with such limitation.

Not later than 5 years after enactment, each major stationary source which certifies that it will comply with an emission limitation under this section or section 183 (relating to default and special rule for growth) through the installation of a technological system of continuous emission reduction, the retirement of existing facilities, the implementation of energy conservation measures, or a combination thereof, shall enter into binding contractual commitments to acquire, install, construct or retire such system or facilities, or provides such services as needed to implement any energy conservation measure.

Each stationary source subject to an emission limitation shall be in compliance with such limitation not later than the date specified in the measures which were submitted or, in no event, later than: (i) January 1, 1998, in the case of limitations in compliance with subsection (a)(1) (relating to achievement of a Statewide emission rate of 0.9 pounds of sulfur dioxide per million Btu of heat input); (ii) January 1, 1996, in the case of emissions limitations in compliance with subsection (a)(2) (relating to achievement of a Statewide average emissions rate for emissions of oxides of nitrogen); (iii) January 1, 1993, in the case of emissions limitations in compliance with subsection (b)(1)(B)(i) (relating to achievement of a five million ton reduction in emissions of sulfur dioxide): (iv) Janauary 1, 1998, in the case of emission limitations in compliance with subsection (b)(1)(B)(ii) (relating to achievement of a 10 million ton reduction in emissions of sulfur dioxide); and (v) January 1, 2000, in the case of emissions reductions in compliance with subsection (b)(1)(B)(iii) (relating to achievement of the twelve million ton reduction in emissions of sulfur dioxide).

Notwithstanding any certification required under paragraph (4)(A), at any time prior to January 1, 1995, the owner or operator of a stationary source subject to an emissions limitation under new section 182 may file an amended certification with the State and the Administrator that such source intends to comply with such emission limitation through the installation of clean coal technology. In such case, the owner or operator of the stationary source shall enter into binding contractual commitments to acquire, install and construct such clean coal technology. The original compliance date continues to apply to the source, unless reductions at another source have been inplemented to assure compliance with section 182 (b)(1)(B).

No major stationary source in operation before January 1, 1981, in any State with an emission reduction requirement under this section and not otherwise exercising its authority to substitute under section 182(b)(4)(F) or (G), shall increase its actual rate of emissions of sulfur dioxide or oxides of nitrogen over that experienced by such source during the calendar year 1980, unless there has been identified for such source in accordance with section 184 (relating to default and rule for growth) of this Act a simultaneous net reduction in emissions of such pollutant at one or more points in excess of the proposed increase in emission rate, and not otherwise required by a State implementation plan under section 110 or 111 of this Act or under this section or section 183 of this part. With respect to any source that increased its rate of emissions prior to the date of enactment of this part, the net reduction in emissions shall be accomplished by January 1, 1998.

Any State with actual utility emissions during calendar year 1985 not exceeding 150,000 tons of sulfur dioxide per year (as determined in the National Acid Precipitation Assessment Program inventory) is authorized to substitute an annual statewide average rate of emissions of sulfur dioxide not greater than 0.9 pounds per million British thermal units, to be achieved not later than January 1, 1993, in lieu of the annual statewide average emission rate specified in section 182(a) and in lieu of the emission reductions for sulfur dioxide otherwise required by section 182(b)(1)(B). A State may make such a substitution in the enforceable measures submitted under section 182(b)(1). In such case, such enforceable measures shall also include provisions to assure that a total actual annual level of emissions of sulfur dioxide in such State in excess of 250,000 tons is prohibited.

In addition, States with actual 1985 utility emissions of less than 40,000 tons per year and with 90% or more of the emissions from a single source, may substitute a requirement that such source comply with section 111(b) requirements (New Source Performance Standards) in lieu of the requirements of the statewide emission rate and the tonnage reduction, subsection (a) and subsection (b)(1)(B), by the year 2003 or by the time such plant reaches thirty years or older, whichever date is earlier. In such a case, the total emissions from such a State may never exceed 100,000 tons of sulfur dioxide.

Together with the enforceable measures submitted by a State and approved by the Administrator under this section 182, the State shall submit—

> an electric load forecast through January 1, 1998, that includes specific projected rates of operation for each utility; and
>
> contingency plans that contain additional enforceable emission reduction measures that shall be implemented in the case actual electric load growth exceeds projected load growth or reductions in electric load due to energy conservation measures do not occur as expected, where such deviations from the forecast would otherwise result in a failure to meet the emission reduction required for such State under section 182.

Each State shall submit to the Administrator annual electric load reports for each year after the submission of such forecast that report changes in actual load from the previous calendar year. If actual electric load and the associated emissions deviate from the forecast to the extent, as determined by the Administrator, that the emission reduction requirements of this section will not be met for such State, the Administrator shall require the implementation of additional enforceable emission reduction measures, including those specified in a contingency plan submitted under subparagraph (A), to assure that such emission reduction requirements are met.

Discussion

The achievement of the average emission rates mandated by this subsection should, in and of themselves, very nearly attain (or, in the case of oxides of nitrogen, exceed) the reduction objectives of 12 and 4 million tons of sulfur dioxide and oxides of nitrogen, respectively. Estimates provided by the Office of Technology Assessment are that the 0.9 pounds per million Btu emissins rate average for sulfur dioxide would achieve a reduction of 11,858,000 tons per year when fully implemented, based on 1980 data.

The following chart contains estimates of utility sulfur oxide emissions for 1980 and 1985 based on NAPAP emissions inventory data (Source: Recent Trends in Sulfur Oxide Emissions from Utilities: 1973 through 1985" Contractor report to U.S. Environmental Protection Agency by E.H. Pechan and associates.) and SO_2 reduction requirements provided by the Office of Technology Assessment.

[In thousand tons]

Reduction requirements—	State		Total emissions—		
	Excess emissions share of 12 million tons	0.9 lb. fossil average	1980 total SO_2 utility	1985 total SO_2 utility	1980 total SO_2
Alabama	387	399	571.0	572.9	790
Alaska	0	5	9.9	9.8	
Arizona	0	0	85.7	109.4	895
Arkansas	2	0	26.1	69.4	75
California	0	0	69.4	2.4	547
Colorado	1	0	78.3	78.6	126
Connecticut	0	0	31.2	55.8	52
Delaware	21	25	52.5	61.7	104
D.C.	0	1	4.2	0.8	20
Florida	432	376	721.9	514.1	1,095
Georgia	557	538	759.4	979.2	862
Hawaii	0	10	38.4	15.6	
Idaho	0	0	0.0	0.0	41
Illinois	819	761	1,145.7	1,113.9	1,392
Indiana	1,310	1,341	1,579.7	1,473.8	1,847
Iowa	149	160	231.2	192.5	328
Kansas	106	36	146.7	151.1	212
Kentucky	783	749	1,048.2	817.8	1,087
Louisiana	0	0	21.1	72.8	288
Maine	6	55	15.8	10.3	123
Maryland	144	134	223.9	215.3	305
Massachusetts	144	129	270.9	229.5	321
Michigan	323	336	570.0	394.2	874
Minnesota	78	60	172.6	120.0	265
Mississippi	86	51	130.6	106.4	278
Missouri	999	928	1,174.1	941.6	1,263
Montana	5	0	25.2	23.0	148
Nebraska	14	0	50.4	45.1	74
Nevada	1	0	40.1	37.8	243
New Hampshire	60	65	81.2	74.1	103
New Jersey	57	0	103.3	96.6	282
New Mexico	34	0	95.9	56.2	275
New York	284	250	489.9	427.3	1,068
North Carolina	190	236	445.5	337.2	617
North Dakota	30	21	82.3	112.6	99
Ohio	1,764	1,900	2,208.5	2,221.4	2,738
Oklahoma	0	0	38.6	79.7	115
Oregon	0	0	3.0	2.3	51
Pennsylvania	1,049	1,034	1,508.2	1,329.6	2,082
Rhode Island	0	0	5.1	2.4	12
South Carolina	134	149	216.3	160.9	318
South Dakota	14	12	28.4	30.7	38
Tennessee	770	790	958.9	802.0	1,086
Texas	57	0	302.4	406.0	1,245
Utah	0	0	22.5	27.8	72
Vermont	0	1	.3	0.8	4
Virginia	63	118	162.7	130.6	348
Washington	36	44	71.3	85.4	255
West Virginia	697	718	968.0	969.1	1098
Wisconsin	357	414	461.5	292.7	681
Wyoming	27	14	126.6	140.8	186
Total	12,000	11,858	17,675.4	16,201.0	26,428

To assure that the mandated reductions in oxides of nitrogen are achieved in an equitable way, acknowledging the technological differences in boiler types, it is necessary to require that the single statewide rate be calculated on the basis of the number and capacity of the differing types of boilers contained within a State. This differentiation is also necessary to assure that certain engine and boiler types are controlled adequately.

Boilers can be classified as follows:

Cyclone boilers have the burner located outside the basic boiler structure. Because of this configuration, the installation of different burner types or add-on controls for NO_x can be said to be difficult and expensive. The only controls available are selective catalytic reduction (SCR) or, possibly, staged-fueled reburning.

Standard wall-fired boilers are those in which the burners are located in the walls of the combustion vessel and the flames are directed toward the center, where the heat is vented upwards. These boilers are manufactured by two United States firms: Babcock and Wilcox, and Foster-Wheeler. These boilers can and have been equipped with "low NO_x burners", which are burners that produce significantly fewer oxides of nitrogen because of their flame pattern and temperature. Relatively speaking, the retrofit of these boilers is inexpensive.

Tangentially fired boilers are those in which the burners are located in the corners of the combustion box pointed toward the centers and sometimes canted upwards. These boilers can currently meet the New Source Performance Standard (NSPS) without low NO_x burners. There is one manufacturer of these, Combustion Engineering. Both wall fired and tangentially fired boilers would have to do slightly better than the current NSPS to comply with the average emission rates required by the bill.

The remaining boilers are used principally for commerical applications (e.g. papermills, small industrial concerns, etc.) and most are "stokers". A stoker boiler is one in which the fuel is burned much as wood and coal are burned in a fireplace; that is on a grate. The fuel is fed into the grate by pushing, or conveyers. Hence the name "stokers". While it can be accurately said that many of these boilers are located in rural areas, they nevertheless contribute to total regional and national loadings or oxides of nitrogen, nitrate, nitric acid, and ozone.

Section 182(a)(2) applies to primary fired units and not to units in which heat recovery from hot gases exhausting from a gas turbine is accomplished, either with or without supplementary firing. Gases from a gas turbine are significantly different than those from a typical firebox-fired fossil fuel steam generating unit because of the high excess air required of gas turbine. This distinction is recognized in the existing New Source Performance Standards for industrial, commerical, and institutional steam generating units, which provide specific NO_x standards for those boilers that are fired with gas, oil or coal. In fact, units conbusting "by products/waste" with natural gas or oil may receive a unit-specific NSPS. Therefore, units that receive all, or a significant portion of, their heat input from the gas turbine section of a combined cycle plant are not included in the NO_x limitations for fossil fuel fired boilers provided in this provision.

New section 182(b) imposes certain explicit requirements intended to assure achievement of the reductions and other requirements of the previous provisions.

Paramount among these is the requirement that the State implement this part, and related provisions, through the adoption and enforcement of enforceable measures. Such measures apply on a source-by-source basis and are, whenever feasible, self-implementing. The purpose of requiring the utilization of enforceable measures is to assure that the effectiveness of the reductions program, and other provisions, are neither attenuated nor otherwise lessened during the course of implementation. Such enforceable measures must include, at a minimum, explicit numeric limits for the emissions rate, hours of operation and rates of operation which are continuously monitored, recorded and, wherever feasible, transmitted to enforcement agencies, through the installation and use of emissions monitoring systems such as stack gas measuring devices operating in conjunction with computers or other electronic or mechanical translation, transmission and recording systems.

A State plan containing such requirements is to be approved by the Administrator within six months after its submission in an acceptable and complete form. Once approved the measures become pat of the State implementation plan and enforceable as such, whether against the Administrator, the State, the source or other parties, under the applicable provisions of this bill and the Clean Air Act. The Administrator's approval must take the form of a finding with respect to each of the requirements of this section.

Section 182(b)(4) requires certification by the owner or operator of a source that it will comply with the emissions limitation, together with a certification of the means by which compliance will be achieved. Such certifications must be provided by senior, responsible corporate officials authorized to act on behalf of and bind the corporation.

In the case of certifications which provide for compliance in whole or part through the use of fuel substitution, or certifications which are not submitted in a complete and timely manner, compliance with the source emission limit is required not later than five years after enactment. Fuel substitution includes, but is not limited to, any change from a fuel which was being utilized prior to the date of enactment to another fuel of higher heat content, lower ash, sulfur or nitrogen content or a more than insignificant increase in the consumption of a fuel above the quantity being consumed prior to the date of enactment in any case where the effect of such an increase would be to provide a source subject to a limitation under this part with credit toward such limitation or reduction. Fuel substitution also includes increases in output of sources, both utility and non-utility, not subject to an emissions limitation under this part, a consequence of which would be to provide a source subject to a limitation under this Act with credit toward such limitation or reduction. Enforceable measures for the purposes of this requirement may include suitable methods designed to assure adequate and timely compliance, including performance bonds and similar contractual commitments.

In the case of certifications which provide for compliance through the installation and operation of a technological system of continuous emission reduction, the retirement of existing facilities, the implementation of energy conservation measures, or a combination of these (but not including any fuel substitution), the owner or operator of such source shall contemporaneously enter into binding contractual commitments to acquire, install, construct or retire such system or facilities, or provide such services as needed to implement any energy conservation measure. A binding commitment is one which cannot be unilaterally abrogated or abridged by a source and which, with respect to such source, automatically results in substantial economic and non-economic penalty for failure either to fulfill contractual obligations or, without regard to cause or fault, failure to comply wholly with the prescribed emissions limit or other requirement on the date specified.

Emissions reductions must have been achieved on or before the date specified, without regard to whether such reductions were to be realized through the use of fuel substitution or otherwise, including conservation measures. The compliance dates imposed as a result of this part are dates by which all reductions are to have been achieved, not dates on which implementation begins. Certifications, binding commitments, and enforceable measures must provide for their continued application in the event an owner or operator opts to submit an amended certification expressing an intention to utilize clean coal technology.

The owner or operator of a source may file an amended certification, executed and attested in the same manner as the original such certification and otherwise satisfying all requirements and conditions applicable to an original certification, at any time prior to January 1, 1995, expressing the intention to comply with such source's emissions limitation through the utilization of clean coal technology, as defined elsewhere in this bill. The filing of such an amended certification does not relieve the owner or operator of any requirement of this or other provision of law, other than to allow such owner or operator until not later than January 1, 1996 to enter into binding contractual commitments to acquire, install, or construct such clean coal technology. Any and all binding commitments with respect to compliance with an emissions limit or reduction by the date originally specified, together with other such commitments and enforceable measures, remain in effect. Nor does the filing of any such amendment authorize the waiver of or excuse the owner or operator for failure to comply with the provisions of this act, including commitments made in or associated with a previous certification, except to the extent commitments in the later certification are substituted.

The amendment establishes a general rule that no major stationary source in operation prior to January 1, 1981, may increase its rate of emissions of oxides or nitrogen or sulfur dioxide above that experienced by the source during calendar year 1980 unless there has been identified a simultaneous net reduction in excess of the proposed increase. This requirement is applicable in States which have an emission reduction requirement assigned under this section and which are not exercising the authorities under subparagraphs (F) and (G). For a source which increased its emissions prior to the date of enactment, the net reduction in emissions must be accomplished not later than January 1, 1998.

States that do not have a specific reduction requirement under this part are not required to offset emissions from new sources, but such States should exercise care in permitting any new major sources of SO_2 or NO_x. Even when such sources meet New Source Performance Standards or Best Available Control Technology requirements, new major sources can contribute to regional visibility problems. The exemption from the offset requirement should not be seen as an invitation to unbridled growth in emission sources.

Reductions for the purpose of providing an offset, like those in compliance with other limitations, are subject to the requirements of paragraphs (2), (3), and (4), as well as other provisions of this section.

While section 184, particularly subsection (b) thereof, is available for the limited purpose of identifying offsets, it does not diminish the obligation of sources, and their owners and operators, to comply with the requirements of this section. Net reductions in emissions, like other emissions limitations and reductions required under this section, must be achieved fully on or before the date specified.

Net reductions must be reductions which are not otherwise required under sections 110 or 111 of the Clean Air Act or under this section or section 183 (relating to default and special rule for growth.) Nor are reductions resulting from the mobile source or other provisions of this bill available for the purpose of this subparagraph. Only reductions which would otherwise not occur may be identified and utilized. Motor vehicles are not point sources under the meaning of section 182(b)(4)(E) and, therefore, cannot serve as the source of a net reduction in emissions.

Some sources may have been shut down for part or all of 1980, for repair, maintenance or other purposes. In this event, whereby the source later resumed normal capacity, the rates of emissions experienced by such source during the calendar year preceding 1980 may be used as the benchmark.

Because of the manner in which the requirement for net reductions, and some other provisions, would operate in States which have small total emissions and a low emissions rate, subparagraphs (F) and (G) authorize a substitute program for such States.

To take advantage of subparagraph (F), a State must have utility emissions in 1985 of less than 150,000 tons of sulfur dioxide, as determined in the National Acid Precipitation Assessment Program inventory for that year. Under subparagraph (F) a State must commit to never exceed a total of all actual emissions during any calendar year of 250,000 tons of sulfur dioxide. A State making such a commitment which otherwise qualifies under the paragraph may substitute for its mandated emissions rate and its otherwise specified tonnage reduction, an annual Statewide average rate of sulfur dioxide of 0.9 pounds per million Btu of heat input, to be attained by January 1, 1993. In implementing these requirements, the State must prepare and submit enforceable measures and otherwise comply with this section and other requirements of the bill. Such a State is free of the offset requirements of section 182(b)(4)(E), and has a 250,000 ton cap in lieu of section 183(b)(2)(B).

According to the best estimates available from the Office of Technology Assessment during the consideration of this measure, the following well-controlled States appear to qualify for a substitute reduction program under paragraph (F): Arkansas, Delaware, Mississippi, Montana, Nebraska, New Jersey, North Dakota, South Dakota and Wyoming. In addition, the following States appear to have no excess emissions (or less than 1000 tons of excess emissions) and thus may have no reduction requirements under part E: Arizona, California, Colorado, Connecticut, Idaho, Louisiana, Nevada, Oklahoma, Utah and Vermont.

To take advantage of paragraph (G), a State must have only one major source and must agree to bring that source into compliance with the new source performance standard at age 30 or as of January 1, 2003, whichever is earlier. Sources located in other States must comply with the new source performance standard upon reaching age 40. In addition, such State must commit to never exceeding a total annual level of emissions of sulfur dioxide of 100,000 tons. In implementing these requirements, the State must prepare and submit enforceable measures and otherwise comply with this section and the other requirements of this bill. It appears that this provision applies primarily to South Dakota and the Big Stone Plant.

In addition to submitting enforceable measures, each State is required to submit certain information and plans relating to projected electricity growth. For States proposing to rely on demand constraints, such as conservation and increased applicance efficiency, to satisfy certain of the requirements of this section, the supplementary submittal must contain additional enforceable measures as contingency plans for failure to assure continual achievement of the load reductions. The enforceable measures contained in the contingency plan must provide for any adjustments necessary to immediately achieve the actual level of emissions specified for each of the sources associated with the plan, as well as economic and non-economic assurances of compliance. The supplementary information is to be based on certifications provided by the owner or operator of each affected utility executed and attested in the same manner as those required under paragraph (4).

DEFAULT REQUIREMENTS AND SPECIAL RULE FOR GROWTH

Summary

New section 183 establishes mechanisms for dealing with growth and those cases where States or sources fail to implement the requirements of this part.

In the case of default by a State (that is, in the case of a State that does not have enforceable measures approved by the Admininstrator within two years and six months after enactment), the owner or operator of each fossil fuel fired steam generating unit in such State which is a major stationary source of emissions of sulfur dioxide shall comply not later than January 1, 1998, with an emissions limitation for each such facility not greater than 0.9 pounds of sulfur dioxide per million Btu of heat input.

Effective January 1, 1998, sources of sulfur dioxide in each State shall comply with the requirements of either section 183(b)(2)(A) or paragraph (2)(B) of section 183(b). Each State shall determine which requirements apply and submit enforceable measures to implement such requirements not later than two years after enactment.

Under the option of section 183(b)(2)(B), on and after January 1, 1998, the aggregate Statewide emissions of sulfur dioxide shall not exceed an aggregate emissions ceiling for such State which is equal to the actual annual emissions in such State between January 1, 1980, and December 31, 1980, minus the reduction in annual emissions determined under section 182(b)(1)(B) (relating to the achievement of reductions in sulfur dioxide emissions of five, ten, and twelve million tons) to be that State's share of the tonnage reduction. The State would elect to permanently limit its total SO_2 emissions to the level attained after the required tonnage reduction, offsetting any future emissions growth.

A State electing the growth mitigation approach of section 183(b)(2)(A) shall further reduce emissions of sulfur dioxide below its share of the tweleve million ton reduction. This further reduction shall be obtained for each year beginning January 1, 1998, and shall be calculated as the amount equivalent to the emissions in excess of 0.9 lbs of sulfur dioxide per million Btu of heat input on a monthly average from each fossil fuel fired steam generating unit (utility and non-utility) the construction of which, as of that year, has been completed for 30 years or more. These additional reductions may be obtained at any source within the State. Emissions attributable to sources going into operation after 1998 need not have their emissions offset. In a State choosing to comply with the requirements of section 183(b)2)(A), unless the State has adopted enforceable emissions limitations meeting the requirements described in the preceding sentences, each particular fossil fuel fired steam generating unit (utility or non-utility) on which construction has been completed for thirty years or more shall comply with an emissions limitation not greater than 0.9 pounds of sulfur dioxide per million Btu of heat input.

Effective January 1, 2003, each fossil fuel fired stationary source is required to comply with the new source performance standards established pursuant to section 111(b) applicable on such date to new sources within such class or category on and after the date 40 years following the completion of construction of such source.

Not later than December 31, 1989, the Administrator shall revise the standards under section 111(b) applicable to new electric utility generating units to express emissions limitations in terms of units of pollutant emitted per unit of electric energy output and to require, consistent with subsection (a)(1) of section 111, that such emissions limitation be achieved through increases in combustion, generating and transmission efficiencies.

Not later than January 1, 1990, the Administrator shall propose revised standards of performance pursuant to section 111 for emissions of oxides of nitrogen from fossil fuel fired steam generating units, including both utility and non-utility units. Not later than January 1, 1991, the Administrator shall promulgate such revised standards of performance. Such revised standards shall reflect improvements in methods for the reduction of emissions of oxides of nitrogen. The Administrator shall consider the degree to which a standard of performance approaching 0.1 pounds per million British thermal units of heat input, or less, is achievable, as determined under section 111.

Not later January 1, 1991, the Administrator is required to promulgate standards of performance under section 111 for new large, stationary disel and turbine engines.

Discussion

This section involves plant specific consequences that may limit the flexibility of a State in choosing the mix of controls necessary to allow it to meet its share of the twelve million ton reduction. First, if a State fails to submit an approvable set of enforceable measures adding up to its share of the 5, 10, or 12 million ton SO_2 requirements, or implementing the NO_x emission, section 183(a) establishes a default requirement. The SO_2 emission limitation of subsection (a) would apply to every utility and industrial boiler within the State, on a unit by unit basis.

Paragraphs (2)(A) and (2)(B) of section 183(b) describe two alternative mechanisms for controlling emissions growth and preventing erosion of the twelve million ton reduction. Under paragraph (2)(B), a State is prohibited from exceeding the State wide aggregate emissions ceiling which it achieved by reducing its emissions from 1980 levels by its share of the twelve million ton reduction. Sources in existence as of 1998 continue to be subject to their emissions limitations, unless reduced to accommodate emission growth from new sources. The legal and practical consequence of this option is to require that for each new source, the State identify point source emissions reductions which at least offset the proposed increase before a permit can be granted for its construction or operation.

Under the option of paragraph (2)(A), offsets are not required for new source growth. New sources are controlled by performance standards under section 111. The emissions associated with new sources are roughly offset by additional reductions at 30-year old plants (or of equivalent amounts of emissions to those associated with less well-controlled 30-year old plants). In States choosing the flexibility inherent in this alternative, emissions within the State must be reduced below the aggregate ceiling by an amount which is equal to the emissions attributable to all sources within the State on which, as of any given year beginning in 1998, construction has been completed for thirty or more years and which emit in excess of 0.9 pounds of sulfur dioxide per million Btu of heat input on a monthly basis. For example, a source on which construction was completed (whether or not it began operation) on July 1, 1969 would be included in the class of sources for which a collective offset would be required during 1999, to the extent that source had an emission rate after 1998 exceeding 0.9 pounds of sulfur per million Btu of heat input. The State could allocate that emissions reduction to any sources, not just the 30-year old plants. The resulting emissions limitations are to be imposed and enforced on each source, based on stack gas monitoring and other enforceable measures. Emissions reductions associated with units that cease operation or reduce hours of operation are not creditable toward the reduction 'requirements of the paragraph.

If a State determines that the requirements of section 183(b)(2)(A) will be applicable within such State, but fails to adopt enforceable emissions limitations meeting the requirements of clause (ii), each fossil fuel fired steam generating unit on which construction has been completed for 30 or more years shall comply with an emissions limitation no greater than 0.9 pounds of sulfur dioxide per million Btu of heat input. Although the effect of this will be to automatically impose the requirements of clause (i) on a plant by plant basis in States which have made a determination that paragarph (2) (A) will be applicable, failure to implement clause (ii) is a violation of the State implementation plan and subject to enforcement under the applicable provisions of this bill and the act. Clause (i) assures that the emissions growth mitigation provisions of section 183(b) can be self-implementing in cases of default.

While the bill allows aging plants to continue their operations at emissions levels higher than could be achieved where a more vigorous and aggressive reduction program is imposed, there reaches an age at which such plants should either retire or comply with the emission limits applicable to new plants. Under the reported bill a plant useful life of forty years is the maximum acceptable age. By the time a source or unit has reached this age, all original equipment will have been fully depreciated. Indeed, that may well have happened by age 35 or even 30 in some States.

The establishment of 40 years as a maximum lifetime does not preclude either the Administrator or the respective states from selecting a shorter lifetime. For purposes of both the 40-year lifetime limitation and the thirty-year, 0.9 pounds of SO_2 per million Btu requirement found elsewhere in the bill, construction is completed on the date the source could commence operations, whether or not it did so. Thus, while there may be some instances in which the completion of construction would be a date earlier than the date on which operation began, in no case could it ever be later than the commencement of operations.

The advantage of controlling emissions growth through the use of a lifetime requirement is that it provides both sources and States with flexibility, while assuring that ultimately emissions are reduced as much as technology will permit. As some units reach age 40 and are required to comply with the NSPS then applicable, compliance with the lifetime limitation will result in emissions reductions which States can utilize in complying with section 183(G)(2)(B). In addition, since the requirement takes effect after the date by which revised new source performance standards must be promulgated for oxides of nitrogen and to recognize energy efficiency, the lifetime requirement should result in enhanced controls or reductions of other pollutants not necessarily subject to an explicit NSPS limitation.

Because of the rapid advances in control, combustion and other technologies, the bill requires that the Administrator, as part of a rulemaking on a revised new source performance standard for oxides of nitrogen from boilers, examine the feasibility of achieving an emissions standard for oxides of nitrogen of 0.1 pounds per million Btu or less. The Administrator's review of technologies which are available in the United States and elsewhere to achieve an emissions rate of 0.1 lb/mmBtu will be on the record, thus providing all interested parties an opportunity to comment. Without repeating the earlier discussion of those technologies which are currently available (e.g. low NO_x burners, as well as non-catalytic and catalytic means of reduction), it is apparent that the current NSPS for oxides of nitrogen does not reflect the level of control required under section 111. These higher levels of reduction are essential if growth in emissions of oxides of nitrogen is to be adequately controlled, especially in the western United States.

Reductions in emissions of oxides of nitrogen from new coal-fired power plants are essential to prevent large increases in emissions of oxides of nitrogen projected by the Environmental Protection Agency for fast growing regions of the country, including the Pacific Coast States, Rocky Mountain States and the South-Central States. An analysis of powerplant emission trends prepared for the Environmental Protection Agency by a consulting firm in March, 1987, shows that a 106 percent increase in utility emissions of oxides of nitrogen are expected in the eleven Rocky Mountain States between 1980 and 2010. These projections assume that: 1) planned increases in generating capacity will be built; 2) coal and not nuclear technology will be used; and 3) new coal-fired units will meet the current NSPS for oxides of nitrogen.

Such large increases in emissions of oxides of nitrogen in these regions would cause a significant deterioration in air quality. For example, in the eight Rocky Mountain States where utility emissions are now more than 60 percent of total emissions of oxides of nitrogen, the projected increase in utility emissions by 2010 would represent about a 60 percent increase. The Environmental Protection Agency's regional modeling assessment of emission increases in oxides of nitrogen expected by 1995 demonstrates that a significant deterioration in visibility would occur in large areas of the Rocky Mountain west, including areas such as southern Utah and western Colorado where the Golden Crescent of national parks is located. ("Modeling Regional Haze in the Southwest," SAI, Inc., February, 1985.) The substantially larger NO_x emission increases expected by 2010 would cause even greater impairment of visibility.

In addition, regional emission increases in oxides of nitrogen would increase acid formation and deposition in these regions. Data from National Acid Deposition Program monitoring stations in the Rocky Mountain states show that nitrate already accounts for 40 percent or more of total acidity being deposited in the poorly buffered high-altitude watersheds.

Finally, large increases in regional emissions of oxides of nitrogen could trigger the formation of ozone non-attainment areas in regions that currently are attainment.

The Administrator of the Environmental Protection Agency is currently under a court order to implement the requirement of section 166 to develop a strategy to prevent any significant deterioration of air quality due to increase in emissions of oxides of nitrogen. However, it is clear that an effective program to limit such emission increases must include requirements to substantially reduce the increase in NO_x emissions currently projected from new coal-fired generating capacity. Other provisions of the bill deal principally with imposing controls on existing sources and therefore do not adequately address new source growth.

The 1990 deadline for commencing the rulemaking allows an opportunity to investigate fully the new coal-fired generating technologies that have emerged in recent years. The one year for completing the rulemaking assures that a new NSPS is in effect as soon after the Part C program for oxides of nitrogen is implemented as possible and requires utilities to incorporate the new NSPS into their capital plans as early as possible.

The Administrator is to consider the full range of technology options, including new electric generating systems (e.g. integrated combined-cycle coal gasification, or so-called "Cool Water" technology) and available continuous emission control technologies (e.g. selective catalytic reduction). Where technologies have been installed and operated on commercial scale units in Japan and Europe, but not in the United States, or if domestic experience with a technology is less well documented, then the Administrator must consider fully the efficacy of such technologies in achieving reductions, even in other countries.

This amendment requires the Administrator of the Environmental Protection Agency to conduct a rulemaking to revise the NSPS for coal-fired units and specifically evaluate technologies capable of achieving 0.1 pounds per million BTU of heat input, or less. In light of the doubling of utility emissions projected for growth regions, emissions may have to be reduced by 80 percent to 90 percent compared to current projections in order to avoid severe air quality impacts. An NSPS at 0.1 pounds per million BTU of heat input, or less, would achieve an 83 percent reduction compared to emissions allowed by the current NSPS. Standards that would be based only on combustion modification techniques in standard boiler designs are anticipated to achieve emission of oxides of nitrogen rates of 0.4 to 0.3 pounds per million BTU of heat input. A standard set at this level would only achieve a 33 percent to 50 percent reduction in emissions of oxides of nitrogen compared to current projections. But a 50 percent to 67 percent increase in utility emissions of oxides of nitrogen by 2010 would still cause unacceptable air quality impacts. Therefore, the Administrator should consider whether advanced power generation technologies or continuous emission control technologies have demonstrated such levels of performance and are expected to be commercially available by the close of the rulemaking.

If the projected increase in emissions of oxides of nitrogen from new sources were allowed to occur, the consequence would be unacceptable increases in acid deposition, ozone formation and decreases in visibility. Although the Administrator has the authority to impose a regional cap on emissions of oxides of nitrogen, a more certain way of minimizing emission increases is to require that new sources install the most efficient technologies at the outset.

Although industrial boilers are estimated to emit the majority of the oxides of nitrogen originating with stationary sources, large engines are estimated to emit about 2 million tons per year of oxides of nitrogen. These very large engines are found principally in the following applications: compressor stations on natural gas pipelines; peaking units for electricity generation; and, in commercial or large-scale residential applications for the generation of heat, steam or power. Some of these engines are internal combustion, while others are turbines. Their power can range from 300 to 20,000 horsepower.

There are a variety of control options available for such engines at reasonable costs. These options include selective catalytic reduction (SCR); non-selective catalytic reduction (NSCR); and, so-called "clean burn" modifications to the engine. The cost of these can be as little as $75 per ton of reductions, making them readily available for both new and retrofit applications.

ENFORCEABLE EMISSION REDUCTION PROGRAMS

Summary

For the purpose of attaining emission reductions required by section 182 of this Act or maintaining the limitation on emissions required by subsection (b)(4)(E) of such section or section 183(b), the following methods or programs for net emission reduction may be used, in addition to enforceable continuous emission reduction measures, by a State or the owner or operator of a source, if emission limitations under such methods or programs are enforceable by the Federal Government, States other than those in which the emissions occur, and citizens under section 304 of this Act:

(1) programs for energy conservation where reductions in emissions can be identified with such programs;

(2) least emissions dispatch to meet electric generating demand at existing generating capacity;

(3) retirement of major stationary sources at an earlier date than provided in schedules on file with the Federal Energy Regulatory Commission, the Internal Revenue Service, or State utility regulatory agencies;

(4) trading of emission reduction requirements and actual reductions on a State or substate basis, for which States and the Administrator are authorized to establish emission banks or brokerage institutions to facilitate such trading; and

(5) precombustion cleaning of fuels.

Section 184(b) provides that it shall be a first priority under this part to achieve the reductions in emissions required by section 182 through conservation of energy. If the Governor of any State certifies to the Administrator, as part of the measures submitted under section 182(b), that a program encouraging or requiring the conservation of electricity will be implemented in such State and that such program will result in a reduction in emissions of sulfur dioxide or oxides of nitrogen, then such State may calculate the extent of the emissions reduction accomplished by such program of conservation, and may comply with the requirements of section 181 and 182 by substituting such emissions reduction for a portion of the total emissions reductions attributable to the emissions rate limitations of section 182(a). Such emissions rate limitations may be adjusted to reflect such substitution.

Section 184(c) prohibits interstate trading of emission reduction requirements and actual reductions or limitations on emissions under section 182(b)(4)(E) under this part, except in the case of trading among units owned by a utility with steam generating units and a service territory in more than one State if the Administrator, in accordance with regulations and prior to the inclusion of emission limitations based on such trading in enforceable measures submitted under section 182(b), determines that such trading is feasible and workable and will result in enforceable emission limitations in each affected State.

Discussion

In order to achieve the reductions required by section 182 (relating to acid precursor controls) or maintain the limitations on emissions required under section 182(b)(4)(E) (relating to the identification and implementation of offsetting reductions for new sources) or section 183(b) (relating to reductions associated with 30-year old plants), States and sources may use methods or programs including, but not necessarily limited to, those identified in the section. Such programs are to be in addition to enforceable continuous emission reduction measures and must be enforceable by the Federal Government, States other than those in which the emissions occurs, and citizens under the Clean Air Act. Enforceability is to be at least as extensive and available as under the Clean Air Act if such programs are to be used.

For programs for energy conservation to be eligible, reductions in emissions are to be identified with such programs and, pursuant to 182(b)(5), accompanied by enforceable measures for other reductions should the conservation measures fail to attain the projected requirements.

Least emissions dispatch, accompanied by stack gas monitoring and real-time recording to assure continual compliance may also be used.

Major stationary sources which have projected retirement dates in filings with the Federal Energy Regulatory Commission, the Internal Revenue Service, or State regulatory agencies in filings made prior to the date of enactment may retire early, provided such retirements are also in advance of the thirty- of forty-year emissions limitations required by other provisions of this part.

Emission reduction requirements and actual reductions may be traded within a State, provided that such reductions are actual (that is, the emissions are measured both before and after the reduction requirements are imposed, committed, or adopted to by the State pursuant to section 182).

Precombustion cleaning of fuels used for the purpose of pollution control, not previously undertaken for ash removal, enhancement of heat value or other non-environmental purposes, may also be used.

In each of these cases, however, if the reduction program is one which results in the use of alternative fuels, reductions must be actually achieved not later than five years after the date of enactment of this part. Such reductions must be achieved in their entirety on or before the applicable effective date.

The reductions in emissions required under this part should be achieved through increases in efficiency and other conservation measures, thus reducing emissions of the complete range of pollutants, not just the few singled out by this bill. A Governor may, pursuant to section 182(b)(4), certify that a program encouraging or requiring conservation of energy will be implemented in such State and that such a program will result in a reduction in emissions.

Such emissions reductions may be substituted for the equivalent fraction of the emission reduction required under the emission rate limitation of section 182(a). This may be translated as a smaller set of plants within the State to which the emission rate applies (leaving some plants achieving their emission reductions by conservation) or by establishing a different emission rate statewide than that required by section 182(a). As with other such emissions limitations required under this part, they must result in actual reductions and must be achieved in their entirety on or before the applicable effective date. Conservation includes increases in combustion, generating and transmission efficiencies which result in reduced fuel consumption per unit of production, as well as reduced quantities of emissions.

Interstate trading of emissions reduction requirements and actual reductions or limitations required under this part are prohibited except in the case of trading among units owned by a utility with steam generating units and a service territory in more than one State, and then only pursuant to regulations promulgated by the Administrator. Such regulations shall assure compliance with all requirements of this part, including the adoption of enforceable measures and compliance with the advanced date for reductions achieved through the use of alternative fuels. In determining whether such trading is feasible and workable, the Administrator shall consider, and the regulations shall provide for, determinations which take into account such system's record of compliance with this and other environmental laws, as well as the enforceability of any such emissions limitations by the Federal Government, other States, and citizens under the Clean Air Act.

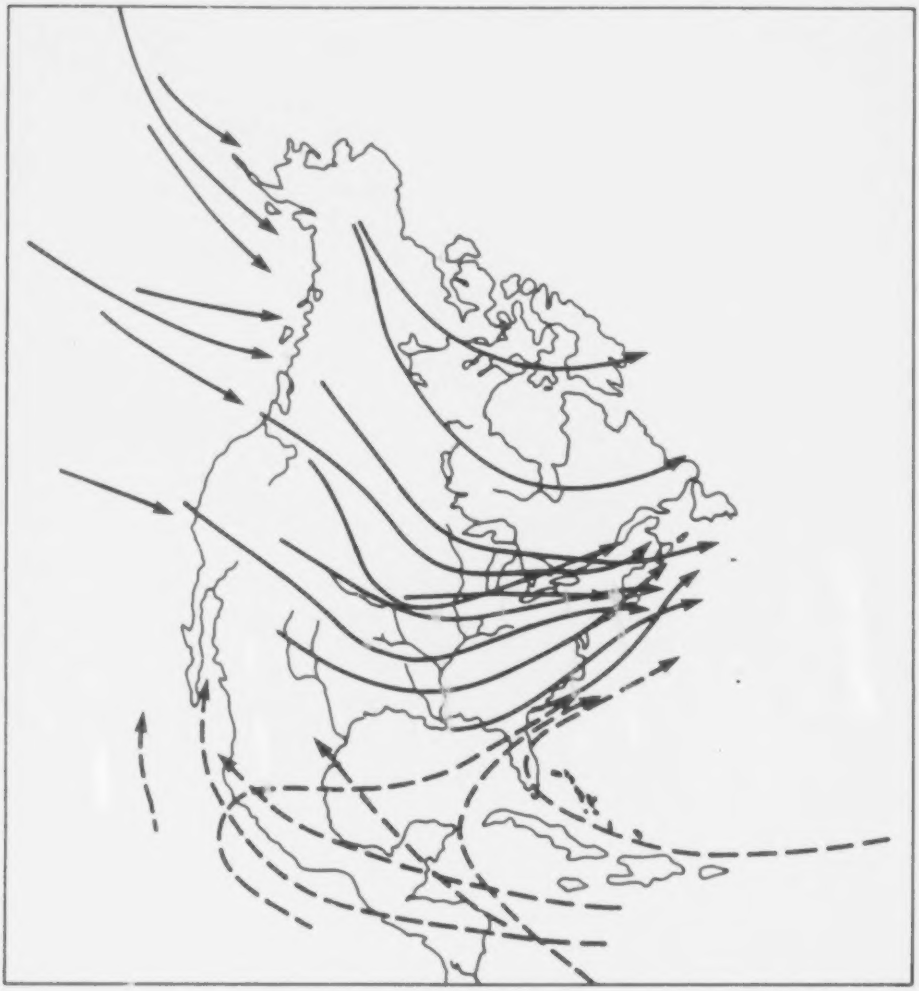
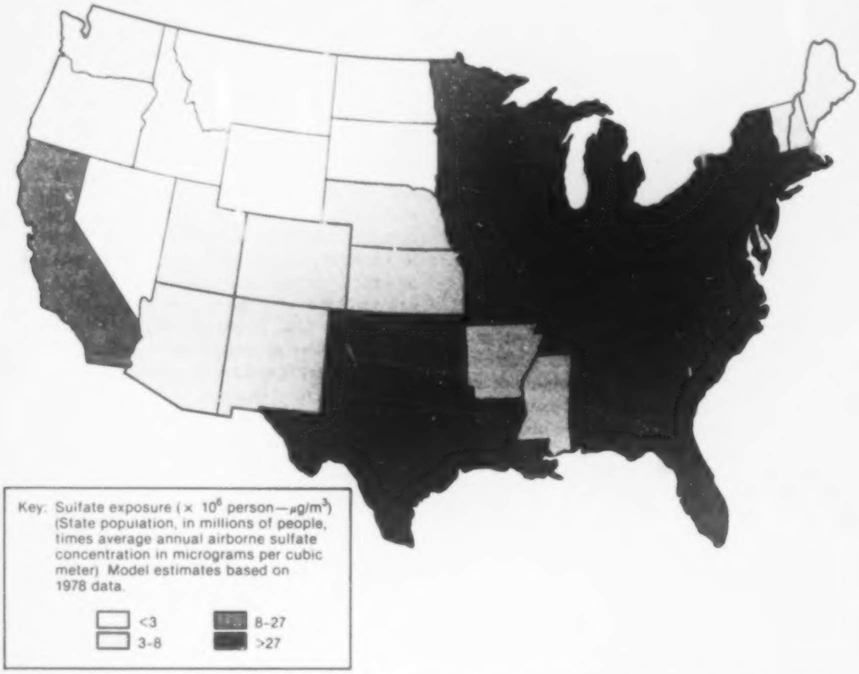


FIGURE II.1.—Major climatological storm tracks for the North American continent. Dashed lines denote topical cylcone centers and solid lines denote those of extratropical cyclones (Hales, 1984).

FIGURE II.2.—Number of grid-point days of stagnation by month for the years 1981-85, obtained by summing the number of days of stagnation at 2 degrees latitude by 2 degrees longitude grid points (Korshover and Angell 1987).

	1981	1982	1983	1984	1985
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	22	0	58	0	84
May	89	100	0	98	0
June	40	42	127	145	167
July	45	0	80	0	28
August	412	104	136	12	114
September	222	114	317	156	226
October	180	151	119	128	28
November	104	70	28	37	0
December	0	0	0	71	0
Year	1114	581	865	647	647

FIGURE III.3.—Population Exposure to Airborne Sulfate (an indicator of potential health effects for sulfates and other airborne particulates in each State).


Key: Sulfate exposure (× 10^6 person—μg/m^3) (State population, in millions of people, times average annual airborne sulfate concentration in micrograms per cubic meter) Model estimates based on 1978 data.
☐ <3
☐ 3-8
▨ 8-27
■ >27

SOURCE: Brookhaven National Laboratory, Biomedical and Environmental Assessment Division, "Long Range Transport Air Pollution Health Effects," OTA contractor report, May 1982

FIGURE II. 4.—MEDIAN SURVIVAL TIME (HOURS) FOR FISH EXPOSED TO ACUTELY TOXIC PH LEVELS

Species	Size or age	pH range—										References [1]
		2.0-2.5	2.6-2.8	3.0-3.1	3.2-3.3	3.4-3.5	3.6-3.7	3.8-3.9	4.0-4.1	4.2-4.3	4.4-4.5	
Brook trout [2]	10-60 g	< 1			7							a
	fngl [3]			2-3	3-6	6-18	10-38	14-51	20-270			b
	2 g	1	2	3-6	12-14	45						c
	90 g	1	4	9	18	61-66	334					c
	60-130 g	< 1		1		5-9						d
	50 g					25	66-70					e
	50-90 g					10-32						f
Rainbow trout [2]	1 g						8	23	37			g
(2)	130 g		1-4	4	8	18						g
(2)	200-300 g	2	2	5								h
	2-5 g			1	2	3	6	17	83	117	133	i
(2)	2-5 g			< 1	1	2	6	27	133			i
(2)	4.5-15 cm			1		2	3	8	22	70		j
(2)	4.5-15 cm			2		3	7	18	55			j
Brown trout [2]	1-5 g					25	40		120			k
(2)	6 g	1-2		3-7					2-4			l
(2)	60-80 g	3	4	9								h
Arctic char [2]	100-170 g	3	3	4								h
White sucker	7 mo			1	2	5	10	30-200	350	1,000		m
Roach	7-13 cm			< 1	1		3	12				j

---

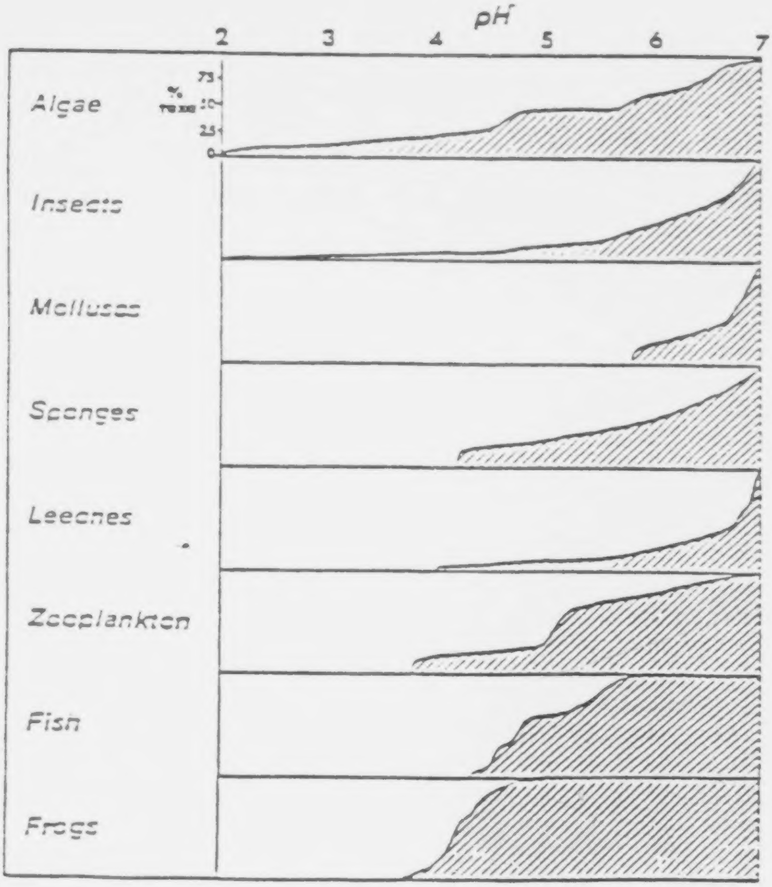
[1] Key to references: a Daye and Garside 1976; b Johnson 1975; c Robinson et al. 1976; d Packer and Dunson 1972; e Swarts et al. 1978; f Falk and Dunson 1977; g Kwain 1975; h Edwards and Hjeldnes 1977; i McDonald et al. 1980; j Lloyd and Jordan 1964; k Brown 1981 with 0.1 millimols of calcium; l Edwards and Gjedrem 1979; and m Beamish 1972.

[2] Denote experiments using low alkalinity water.

[3] fngl: Fingerling, age 0 + (less than 1 yr), weight usually < 50 g.

Source: Altshuller and Linthurst (1984).

FIGURE II.5.—Percentage Variations in Number of Species with Decreasing pH.



Source: United States-Canada Work Group I. Impact Assessment. In accordance with the United States-Canada Memorandum of Intent on Transboundary Air Pollution. Final report, 1983.

FIGURE II. 6.—PERCENT SURVIVAL OF FISH EXPOSED TO CHRONICALLY TOXIC PH LEVELS

Species	Size or age	Length of exposure (days)	pH range—									References [1]
			3.2	3.6	4.2-4.4	4.5-4.6	4.8-5.0	5.2-5.6	5.9-6.2	6.5-6.8	7.0-7.5	
Brook trout	100–300 g	5			60–90						100	a
(2)	10–60 g	7	0	85	100		100	100		100		b
(2)	5 g	11			100		100					c
	50 g	65			0–36							d
	150–360 g	150				0	75			75	100	e
Rainbow trout [2]	200–300 g	100					93	96	97			f
Brown trout [2]	60–80 g	100					94	98	95			f
Arctic char [2]	100–170 g	100					90	100	100			f
Fathead Minnow	1 yr	400				80		75	85	75	85	g
Flagfish [2]	Mature adult	20				36	86	79	100	93		h

[1] Key to references: a Dively et al. 1977; b Daye and Garside 1975; c Baker 1981; d Swarts et al. 1978; e Menendez 1976; f Edwards and Hjeldnes 1977; g Mount 1973; h Craig and Baski 1977.

[2] Denote experiments using low-alkalinity water.

Source: Altshuller and Linthurst (1984).

FIGURE II. 7.—TOTAL ESTIMATED LAKE AND STREAM RESOURCES IN THE ACID-SENSITIVE REGIONS OF THE EASTERN UNITED STATES (See fig. B–1)

Region	Sensitive area (mi ^{2})	Total lakes		Total streams (mi)	
		Number	Acres	1st order	2d order
1. Eastern Maine	26,398	1,425	582,825	9,714	3,485
2. Western New England	29,666	1,543	763,785	15,308	4,569
3. Adirondacks	14,066	1,139	231,217	5,289	3,024
4. East Pennsylvania/South New England	20,947	1,320	118,800	8,400	2,556
5. West New York/Pennsylvania	25,051	376	16,920	7,114	1,678
6. Appalachian Plateau	16,190	13	29,510	7,350	2,299
7. Blue Ridge/Great Smoky Mountains	20,964	126	14,868	10,901	3,396
8. Coastal Plain	9,264	241	8,917	1,547	713
9. Lower Mississippi	13,075	170	56,610	5,374	1,255
10. Indiana/Kentucky	8,603	9	603	2,805	989
11. Central Wisconsin	12,141	583	187,726	2,683	728
12. Wisconsin/Michigan Highlands	19,229	5,307	801,357	5,037	1,737
13. Northeast Minnesota	10,560	1,637	473,093	1,637	475
14. Central Minnesota	18,870	3,170	323,340	4,831	2,529
Total	245,024	17,059	3,609,571	87,990	29,433

Source: "Regional Assessment of Aquatic Resources at Risk From Acidic Deposition," prepared for OTA by The Institute of Ecology, June 1982.

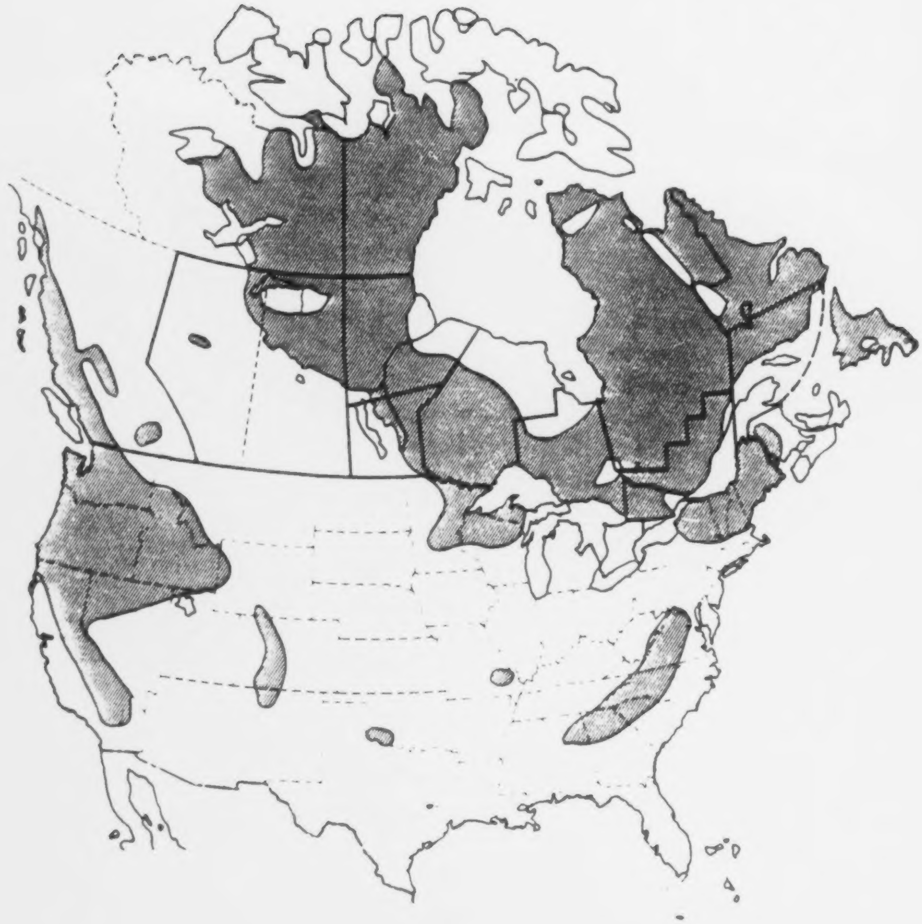


FIGURE II.8.—Regions of North America with low geochemical capacity for neutralizing acid deposition. Source: Galloway and Cowling (1978).

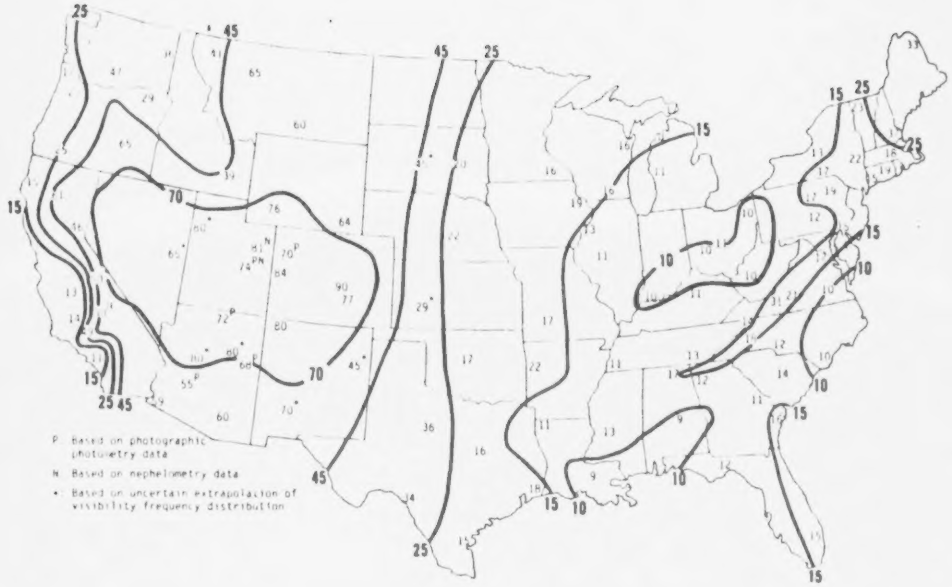
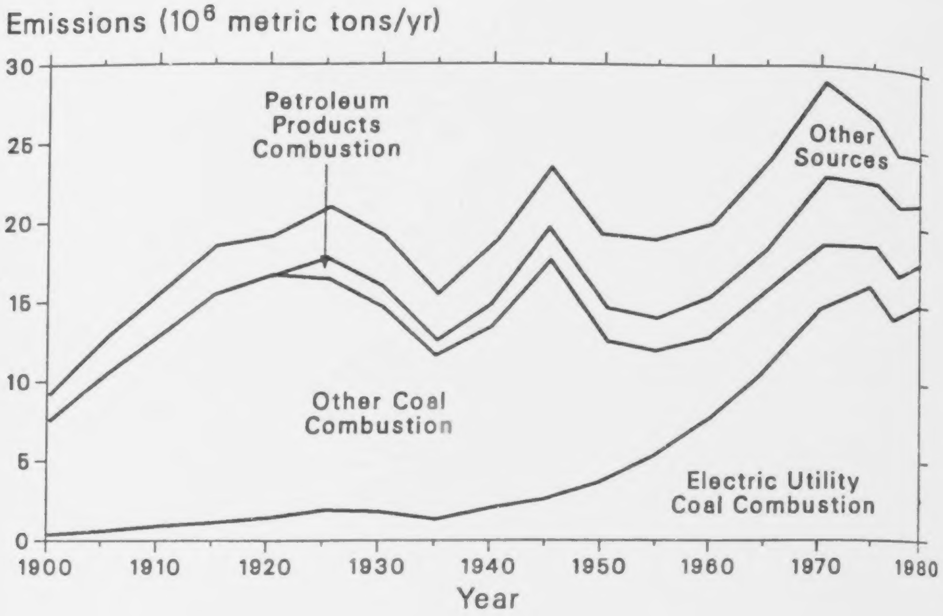

P Based on photographic photometry data
N Based on nephelometry data
* Based on uncertain extrapolation of visibility frequency distribution
25
45
70
15
10

FIGURE II.9.—Median annual visual range (in miles) at suburban/nonurban locations in the United States (1974–1976). Source: Trijonis (1982).

FIGURE II.10.—Historical trends in U.S. man-made SO_2 emissions, by source category: 1900 to 1980. Source: Gschwandtner et al. 1985.



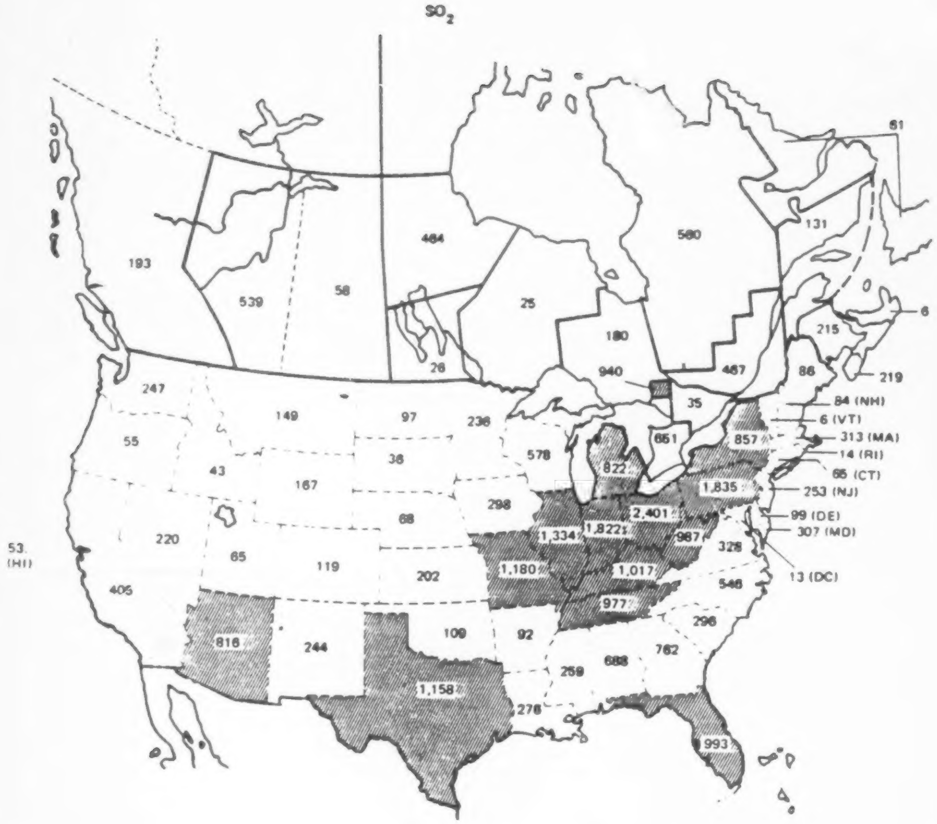

SO_2
193
539
58
464
25
580
131
81
6
215
219
180
940
26
487
86
84 (NH)
6 (VT)
313 (MA)
14 (RI)
65 (CT)
253 (NJ)
99 (DE)
307 (MD)
13 (DC)
35
651
857
1,835
247
149
97
236
55
43
38
578
822
167
298
2,401
53
(HI)
220
68
1,334
1,822
987
65
119
202
1,180
1,017
328
405
546
977
816
244
109
92
296
762
259
688
1,158
278
993

FIGURE II.11.—Representative values of SO_2 emissions in the United States and Canada in 1980 (thousands of metric tonnes). Source: U.S./Canada Work Group #3B (1982).

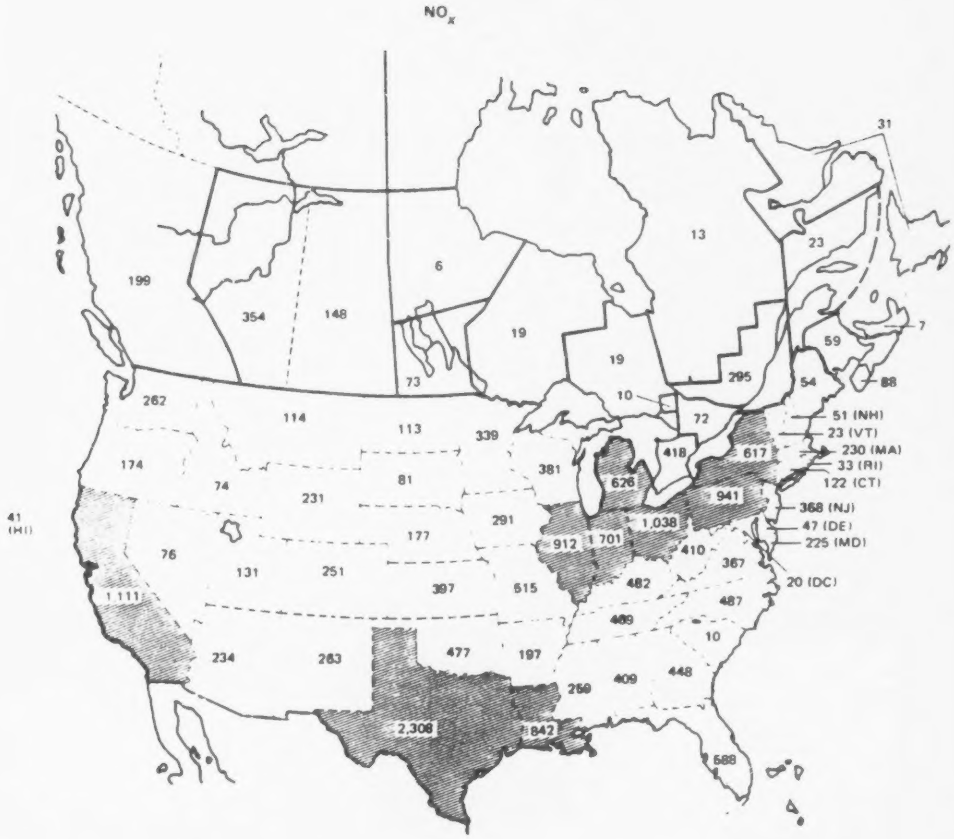

NO$_x$
199
354
148
6
19
19
13
23
31
7
59
88
54
10
295
72
73
262
114
113
339
381
418
617
626
941
51 (NH)
23 (VT)
230 (MA)
33 (RI)
122 (CT)
368 (NJ)
47 (DE)
225 (MD)
20 (DC)
174
74
81
231
291
41 (HI)
177
912
1 701
1,038
410
76
131
251
397
515
482
367
1 111
487
469
10
234
263
477
197
259
409
448
2,308
842
588

FIGURE II.12.—Representative values of NO$_x$ emissions in the United States and Canada in 1980 (thousands of metric tonnes). Source: U.S./Canada Work Group #3B (1982).

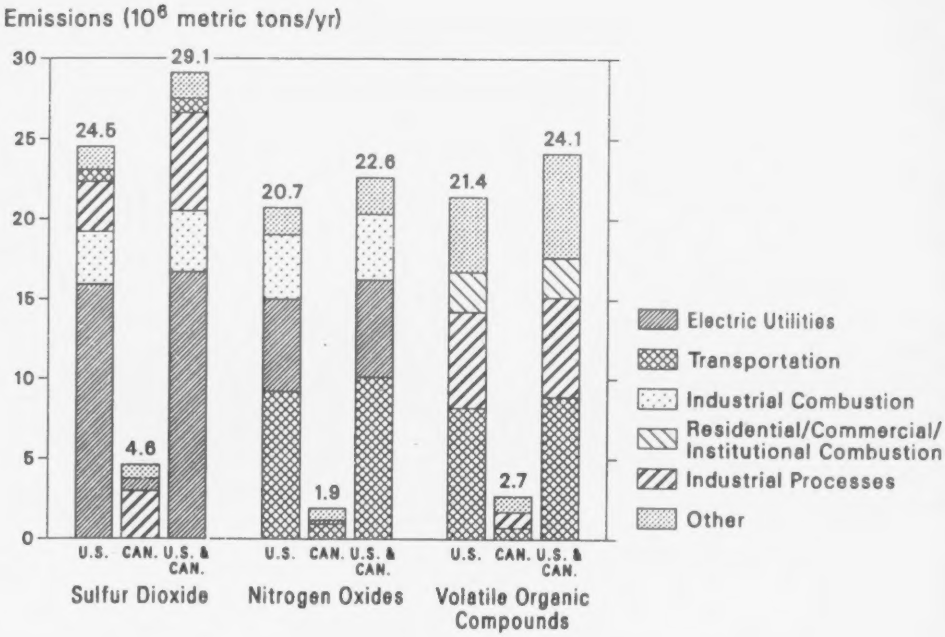


FIGURE II.13.—Estimated man-made emissions of SO_2, NO_x, and VOC in the United States and Canada in 1980.

Note: The "other" category in each bar includes miscellaneous sources and all categories not shown individually. Emissions of SO_2 include emission of all sulfur compounds expressed in terms of the molecular weight of SO_2. Emissions of NO_x are expressed in terms of the molecular weight of NO_2, and emissions of VOC are expresed in terms of the molecular weight of the VOC species emitted. Emissions of VOC exclude methane and ethane emissions. Emissions of NO_x and VOC include emissions from forest fires, agricultural burning, incineration, and other similar activities. The "industrial processes" category includes solvent evaporation. Estimates of SO_2 for the United States and all emissions for Canada are from the 1980 NAPAP Emissions Inventory (Wagner et al. 1986). Values for NO_x and VOC for the United States are the "best estimates" presented in Tables 1-13 and 1-20.

CLEAN COAL TECHNOLOGY (PROPOSED PART F)

SUMMARY

Section 201 of the reported bill adds two new parts to the Clean Air Act: 1) the new Part E would provide for control of the emissions of air pollutants which are the precursors of acid deposition and is discussed above; and 2) the new Part F authorizes a 5-year, $5 billion program to demonstrate "clean coal technologies" which might be employed to achieve the objectives of the control program.

Part F is the legislative embodiment of the recommendations of the Special Envoys on Acid Rain appointed by the United States and Canada in 1985. Their joint report, issued in January 1986, called for a 5-year, $5 billion program to demonstrate technologies more cost effective than current pollution control equipment (i.e. scrubbers) that might be employed without significantly disrupting markets for Midwestern high-sulfur coal. They also reported that these demonstration projects could achieve some near-term reductions in the acid rain precursor pollutants currently moving across the border from the United States into Canada.

The program authorized by part F is to be administered jointly by the Department of Energy (DOE) and the Environmental Protection Agency (EPA). It will support the construction and operation of pollution control systems for sulfur dioxide and nitrogen oxides at facilities which generate electricity or industrial process steam. The administering agencies are to conduct two solicitations for proposals, one 210 days after enactment and one 21 months after enactment. Projects selected are to be in operation within 36 months of selection.

The following criteria recommended by the Envoys are to be used in the selection of projects: (1) the technology employed will be available for retrofit on a large number of existing sources; (2) the projects will reduce transboundary movement of air pollutants which are precursors of acid deposition; (3) the technology will achieve significant reductions in precursor emissions or will be significantly more cost-effective than existing technology; and (4) the projects will be located in the U.S. and utilize American coal.

The program is authorized at $500 million per year for the fiscal years 1988 through 1992, for a total of $2.5 billion in Federal funds. These funds are to be matched by (at least) an equal amount from the project sponsors.

In addition the reported bill creates an advisory committee to provide technical assistance and the views of the States and Canada in the project selection process.

DISCUSSION

Special Envoys Report.—In 1985 President Reagan traveled to Canada for his first summit with the recently-elected Prime Minister, Brian Mulroney. That summit became known as the "Shamrock Summit." High on the Canadian agenda for that summit was the problem of acid rain. The two leaders agreed to appoint special envoys to further explore the problem of acid rain and transboundary air pollution. The United States envoy was Mr. Drew Lewis, former Secretary of Transportation. Canada selected Mr. William Davis, formerly the Premier of Ontario, as its envoy.

After many months of meetings and deliberations, the Special Envoys issued a joint report including findings and recommendations in January of 1986. Among the findings of the Special Envoys were these two very important statements:

> Acid rain is a serious environmental problem in both the United States and Canada. Acidic emissions transported through the atmosphere undoubtedly are contributing to the acidification of sensitive areas in both countries;

and

> Acid rain is a serious transboundary problem. Air pollutants emitted by sources in both countries cross their mutual border, thus causing a diplomatic as well as environmental problem.

In addition to these findings the report included an assessment of the acid rain problem from the perspective of each nation. The report also analyzed the available means to control emissions of the air pollutants which are the precursors of acid deposition. The Special Envoys came to the conclusion that the available control strategies (although effective in reducing pollution) are not of a character to foster a consensus for action within the American community.

Sulfur dioxide emissions, the principal pollutant of concern, can be reduced in a variety of ways. Three control strategies were examined closely by the Envoys. The sulfur can be washed from the coal before it is burned. The utility or industrial facility can switch to coals having a very low sulfur content. Or, as a third option, so-called scrubbers can be added to remove sulfur dioxide from the flue gas produced by combustion.

The Envoys found fault with each of these three strategies. Coal washing produces only modest (20–30 percent) reductions in emissions, whereas a substantial reduction is necessary to protect the sensitive aquatic resources in eastern Canada and the northeastern United States. Switching to low-sulfur coal might cause severe economic disruption in the high-sulfur coal fields of the Midwest. And scrubbers are an expensive technology which might lead to electricity rate increases in areas required to make substantial emissions reductions.

According to the Envoys there are, however, other pollution control technologies—not widely used at commercial scale in the United States today—which may provide substantial reductions in the emissions of sulfur dioxide and nitrogen oxides at a lesser cost than scrubbing without disruption in the markets for high-sulfur coal.

To take full advantage of these technologies and to encourage the development of a policy consensus in the United States leading to significant reductions in transboundary pollution, the Envoys recommended a 5-year, $5 billion program to deploy these technologies at commercial scale in the United States.

The heart of the Envoys' joint report is the following recommendation which sets forth a series of criteria to be used in selecting projects for Government support:

> Therefore, the U.S. Government should implement a 5-year, $5 billion control technology commercial demonstration program. The Federal Government should provide half the funding—$2.5 billion dollars—for projects which industry recommends, and for which industry is prepared to contribute the other half of the funding.
>
> Because this technology demonstration program is meant to be part of a long-term response to the transboundary acid rain problem, prospective projects should be evaluated according to several specific criteria. The Federal Government should co-fund those projects that have the potential for the largest emissions reductions, measured as a percentage of SO_2 and/or NO_x removed. Among projects with similar potential, Government funding should go to those that reduce emissions at the cheapest cost per ton. More consideration should be given to projects that demonstrate retrofit technologies applicable to the largest number of existing sources, especially existing sources that, because of their size and location, contribute to transboundary air pollution. In short, although the primary purpose of this research program is to demonstrate the kinds of technologies that would be needed for any future acid rain control program, it should also result in some near-term reductions in U.S. air emissions that affect Canadian ecosystems.
>
> Furthermore, special consideration should be given to those technologies that can be applied to facilities currently dependent on the use of high-sulfur coal.

The Envoys recommended that a multi-member panel be established to implement the program. The panel would include U.S. EPA and DOE for the technical expertise necessary to select projects, but also would include the State Department, representatives of several American States and a representative from the Canadian Government. In response to this recommendation a 38-member advisory body, headed by DOE and including representatives from EPA, the States and Canada, was established.

The report included several recommendations for further research (dry deposition monitoring; rates of watershed response; aquatic biology; forest effects; materials damage; mobilization of heavy metals) and called for the establishment of a bilateral advisory and consultative group on transboundary air pollution.

On March 19, 1986 and in response to the Joint Report, President Reagan stated, "I fully endorse the report and will shortly issue a press statement to that effect." Eventually, a press release was issued which summarized all of the coal research being conducted in the United States and concluded that the Envoys' recommendations could be satisfied by the existing research effort including the modest Clean Coal Technology program which was being conducted by the U.S. Department of Energy.

Clean Coal Technology Reserve.—The DOE Clean Coal Technology (CCT) program was established by Public Law 98-473 (the Continuing Resolution for 1985) which transferred $750 million from the funds that had been available to the Synthetic Fuels Corporation (which was soon to be terminated) to a new "Clean Coal Technology Reserve." Although these funds were not immediately appropriated due to strong opposition to the new program from the Administration, DOE was instructed to solicit statements of interest from the private sector proposing projects for joint funding with the Government which would demonstrate emerging clean coal technologies. Further, DOE was directed to analyze the proposals and to report to the Congress on "the extent to which Federal incentives, including financial assistance, will accelerate the commercial availability of these technologies." In a report dated May 1, 1985, DOE noted that it had received 175 project proposals with a total capital cost of $8 billion.

In the 1985 Supplemental Appropriation (P.L. 99-88), and again without actually making appropriations, the Congress established criteria for selecting among proposed projects and urged, "The Department [of Energy] to begin preparation of a competitive solicitation for clean coal technology demonstrations so that fiscal year 1986 funds, if provided, can be obligated in a timely way." The criteria (as established by Senate Report 99-82 and House Report 99-236) are as follows:

I. General project guidelines:

1. The project must demonstrate commercial feasibility of the technology or process and be of commercial scale or of such size as to permit rapid commercial scaleup.
2. The project should utilize or expand the utility of technologies, techniques or processes which would not duplicate a commercial scale demonstration currently being conducted in the United States.
3. The clean coal technology, alone or in conjunction with other technologies must result in emission levels that comply with or exceed Clean Air Act requirements, in a cost-effective manner.
4. The technology to be demonstrated should be available for commercial application no later than the 1990's.
5. The project sponsor(s) must be willing to commit at least 50 percent cost sharing including, but not limited to, project sponsor funds or other resources. In determining the degree of Federal sponsorship, the Government should take into account the total estimated costs of the project and the degree of risks and ultimate benefits associated with the technology.
6. The project sponsor(s) must have relevant experience and possess the capability and resources to assure the project is properly engineered, constructed and operated.

II. Subsequent applicability of the technology:

1. The clean coal technology to be demonstrated in either new or retrofit applications must provide significant potential for replication.

2. The project must provide useful technical, environmental, operational performance and economic data to reduce the uncertainties of subsequent commercial scale utilization of the technology.

III. Technical feasibility:

1. Sufficient technical data (including data developed from pilot plant operations, if any) should be available to determine that the demonstration will have a significantly high probability of success.

2. The technology should have been successfully tested at the bench scale or subsequent stage of development.

IV. Environmental benefits:

1. The commercial application of the clean coal technology for retrofit applications on fossil fuel-fired plants is likely to result in a reduction of emissions from the use of coal at a cost which is competitive with the cost of achieving comparable emissions reductions by current technology.

2. The commercial application of clean coal technology for precombustion cleanup shall result in reductions in sulfur and ash content which will allow compliance with emissions requirements in a cost-effective manner.

3. The commercial application of the technology for new applications shall achieve emissions levels equal to or better than new source performance standards for that source category in a cost-effective manner.

4. The amounts and characteristics of waste products must be identified and processes for proper handling and disposal (or utilization and regeneration) in an environmentally acceptable manner must be in the project proposal.

V. Economic feasibility:

1. The projected commercial application should be economically attractive.

2. The project , where appropriate, should include characteristics which permit modularity, shop fabrication of transportable components, operating flexibility or maintainability and reliability of units, or other characteristics which permit shortened construction periods or lower overall capital costs for subsequent commercial projects.

As there has never been an authorization of the DOE CCT program, the above language from the report on an appropriations bill (not actually making appropriations for the program) continues as the statement of Congressional intent for the expenditure of the reserved $750 million. Comparing these criteria to those of the Special Envoys, one finds little overlap. Both programs would focus on technologies more cost-effective than scrubbers, but the DOE program contains no emphasis on retrofit at existing plants or reduction in transboundary movement of acid rain precursors.

It must be said, however, that the Clean Coal Technology program was not created in anticipation of the Envoys' report nor as an answer, even in part, to the domestic acid rain problem. The purpose of the DOE program is to demonstrate the whole range of innovative technologies which would encourage the use of large domestic coal reserves.

As the Congressional Research Service concluded in a recent paper:

> In summary, if responding to acid rain involves massive reductions in SO_2 and/or NO_x emissions over the next 10–15 years, then the Clean Coal Technology Reserve, per se, is not a response. To be effective the reserve would have to include a regulatory structure attached to it to provide the necessary markets for the retrofittable control technologies developed, and probably, increased funding.

Finally, in the Continuing Resolution for 1986 (P.L. 99–190), the Congress appropriated $400 million of the $750 million CCT Reserve ($100 million in fiscal year 1986, $150 million in fiscal year 1987 and $150 million in fiscal year 1988) and instructed DOE to issue a solicitation for proposals from private industry within 60 days. The resulting Program Opportunity Notice (PON) was issued on February 17, 1986. In its solicitation document, DOE described the program as follows:

> The PON is open to all market applications of clean coal technology that apply to any segment of the United States coal resource base. This includes applications for utilities, industry (including steel and iron ore processing), commercial and residential markets, and transportation. . . . The PON is open to both "new" and "retrofit" applications, whether intended to displace oil and natural gas or to utilize coal more cleanly, efficiently, and/or economically than presently available technology.

Comparing the goals and objectives of the DOE Clean Coal Technology program and the criteria for funded projects as recommended by the Special Envoys, a Congressional Research Service report came to the following conclusion:

> The goals of the Envoys' recommendation and DOE's Clean Coal Technology Program differ greatly in their generality. The goal of the Clean Coal Technology is to demonstrate a broad range of technologies to increase application and use of coal balanced with the need for environmental protection. The goal of the Envoys' recommendation is to develop more cost-effective technologies to control SO_2 and/or NO_x emissions from existing sources. In the course of doing this, some near-term reduction in emissions is expected. The Envoys are concerned about acid rain and protecting high-sulfur coal miners' jobs, the CCTP is con-

> cerned with expanding opportunities for coal use balanced with environmental protection.
>
> Consequently, any project that would meet the Envoys' criteria would probably be eligible under DOE's program criteria, but the converse is not true: many projects meeting the DOE's criteria would be irrelevant to the Envoys goals . . .

The February, 1986 PON suggested that the following technologies would be eligible for funding under the Clean Coal Technology program: advanced coal cleaning; coal slurries; post-combustion cleanup; in-boiler control of oxides of sulfur and nitrogen; fuel cells; heat engines; fluidized bed combustion; gasification (including underground, combined cycle and synthesis); advanced combustors; liquefaction; hot gas stream cleanup; magnetohydrodynamics; and advanced industrial processes.

DOE received 57 project proposals in response to the solicitation and in August of 1986 tentatively selected nine projects for funding (after negotiation of contracts with project sponsors which may take up to 2 years). (see Figure II. 14. for the list of projects selected.)

FIGURE II. 14.—DOE CLEAN COAL TECHNOLOGY PROJECTS

Sponsor	Technology	Project location
American Electric Power Service Corp., Columbus, OH.	Pressurized Fluidized Bed Combustion Combined Cycle Utility Retrofit	Brilliant, OH.
Babcock & Wilcox, Alliance, OH	Extended Tests of Lime-stone Injection Multistage Burner Plus Sorbent Duct Injection.	Lorain, OH.
Coal Tech Corp., Merion, PA	Slagging Combustor with Sorbent Injection into Combustor	Williamsport, PA.
Energy and Environmental Research Corp., Irvine, CA.	Gas Reburning & Sorbent Injection retrofit into three utility boilers	Springfield, IL. Hennepin, IL. Bartonville, IL
Energy International, Inc., Cheswick, PA.	Steeply Dipping Bed Underground Coal Gasification Integrated with Indirect Liquefaction.	Rawlins, WY.
General Electric Co., Cincinnati, OH.	Integrated Coal Gasification Steam Injection Gas Turbine Demonstration plants (2) with Hot Gas Cleanup.	Evendale, OH. Dunkirk, NY.
The M.W. Kellogg Co., Houston, TX.	Fluidized Bed Gasification with Hot Gas Cleanup Integrated Combined Cycle Demonstration Plant.	Cairnbrook, PA.
Ohio Ontario Clean Fuels, Inc., Poland, OH.	Coal-Oil Coprocessing Liquefaction	Warren, OH.
Weirton Steel Corp., Weirton, WV	Direct Iron Ore Reduction to Replace Coke Oven/Blast Furnace for Steelmaking.	Weirton, WV.

Because of the Administration's assertion that the DOE program would satisfy the commitment made in the Envoys' report, these nine projects have been closely examined to determine whether they do, in fact, meet the criteria for projects which were established by the Envoys. Most analysts have come to the same conclusion—the projects make only minor contributions to the commitment which this Nation made to Canada when the President endorsed the Envoys' report.

In March of 1987 (shortly before the second Reagan-Mulroney summit hosted by Canada), the Ambassador to the United States from Canada wrote to the Chairman of the Subcommittee on Environmental Protection offering the following analysis of these nine projects:

Because of the seriousness with which my Government views the Envoy process and the importance to Canada of its ultimate success, Environment Canada undertook extensive analysis of two issues—the DOE claim that the nine CCT projects satisfy the Envoys' recommendations and the Administration's suggestion in the FY 1988 budget proposal that current programs fulfill President Reagan's commitment to implement the Envoys' Report. Environment Canada's findings sharply contrast with DOE's and the budget proposal's conclusions. With respect to the particular projects selected in the first round of the CCT program, Environment Canada found:

—The nine projects selected might, if they displace production from existing plants, reduce U.S. SO_2 emissions by up to 65,000 metric tonnes. (In 1984 total U.S. SO_2 emissions were 21.4 million tonnes.)

—The projects will make no significant nearterm contribution to reducing transboundary emissions.

—The projects have very limited early retrofit potential; the impact of the new technologies on electric utility emissions will be negligible until after the year 2005.

—Only two of the nine selected projects come close to meeting the Special Envoys' recommendations and criteria.

A recent Congressional Research Service analysis of the CCT program concurs with the conclusions of Environment Canada's studies. Specifically, CRS found that only three of the nine projects selected possibly meet the Envoys' criteria, and one of those three is so small that no emission reductions can be expected from it. The total cost of the three projects is only $52 million (approximately 1 percent of the 5-year, $5 billion commitment). According to CRS:

> To achieve the goals of the Envoys' Report would require an integrated approach to clean coal technology demonstration focused on the Envoys' recommendation and its goals. Such a program does not currently exist.

Environment Canada also assessed the various clean coal initiatives mentioned in the Administration's recent fiscal year 1988 budget proposal, based on information provided by DOE. It concluded:

—Only $1.7 billion of the proposed $5 billion in Federal, state, and private expenditures appear to meet most of the Special Envoys' technical criteria.

—The potential reduction in transboundary pollution resulting from this spending is insignificant and will not alleviate the damage currently being caused in Canada by U.S. emission of SO_2.

—In the absence of an acid rain control program, significant emissions reduction resulting from the currently planned clean coal technology initiatives or existing air pollution control programs are at least 25 years away.

> Based on these findings, it is our view that the current U.S. clean coal technology program does not meet the objectives of the Envoys' Report or still Canadian concerns about acid rain. However, bearing in mind the full endorsement of the Lewis/Davis Report by the President and pursuant to the Vice President's recent visit to Ottawa, it remains the hope and expectation of the Canadian Government that the Administration will take steps to fulfill Mr. Reagan's commitment.

Just before President Reagan's trip to Canada in April of 1987 for the summit meeting with Prime Minister Mulroney, the Administration issued a statement indicating that it continued to fully support the Special Envoys' report and that it would be requesting authorization and appropriation of the full $2.5 billion Federals share for a demonstration program to be conducted over the next five years. Subsequently, an amended budget request and a proposed authorization bill were transmitted to the Congress.

In September of 1987, DOE announced that it had been unable to negotiate successfully with two of the original nine project sponsors and that alternative proposals would be substituted.

Appropriations bills now pending before the Congress include further spending from the CCT Reserve to support this effort.

In November 1986 (and again at Congressional direction through P.L. 99-500) the Department of Energy conducted a second informational solicitation for "statements of interest in, and information proposals for retrofit, repowering or modernization technologies." A total of 139 responses with a capital value of $5.159 billion were received. Based on this expression of interest, it appears that industry is prepared to construct commercial-scale demonstrations of several technologies that would have broad applicability in the retrofit market. Of the responses received 49 were for flue gas cleanup, 25 were for coal cleaning, 15 were for fluidized bed combustion and 13 were for advanced combustors.

Emerging Technologies.—The following discussion from a 1985 CRS paper summarizes the types of technology that might be eligible for; funding under a program focused on near-term reductions of sulfur dioxide and nitrogen oxide emissions from existing powerplants.

> Clean Coal Technology is a generic term encompassing a variety of techniques for reducing SO_2, and/or NO_x, and/or particulates. The technology may be designed to be retrofitted on older boilers without major modification, or be primarily intended for new power plant construction. The technology may be able to achieve NSPS for one or more pollutants, or achieve a more modest reduction in pollutant emissions. The technology may be projected to provide only a modest cost saving over current technology, or a substantial saving. Finally, a technology may be ready for demonstration now, or require several more years of development before a demonstration would be appropriate.
>
> Given these numerous technical and economic parameters, what criteria would be appropriate for a demonstration program focused on acid rain? First, if one accepts

that damage attributed to acid rain is occurring at current SO_2 and NO_x emission levels, then the focus of concern is with existing, older units which do not meet NSPS . . .

Second, if acid rain is considered an urgent problem, as some have suggested, then near-term technology should be chosen. This, of course, is consistent with the general purpose of a demonstration program, but might effectively eliminate some technologies, such as pressurized fluidized bed combustion, whose lead-times are considered to be longer.

Third, none of the acid rain proposals introduced in the Congress would require all sources to meet NSPS (90 percent SO_2 removal for high-sulfur coal plants). Hence, technologies which achieve only a 30 to 70 percent removal of pollutants (either alone or in combination) could be useful in meeting an acid rain reduction program.

Finally, technologies chosen should have the potential to be more cost-effective than current technology in meeting reduction goals . . .

The following discusses representative technologies within each of . . . three categories which might be useful in meeting an acid rain program focused on existing facilities.

Pre-combustion technologies

Pre-combustion technologies, such as coal cleaning, have several advantages in controlling SO_2 emissions in an acid rain program. Because the sulfur is removed before combustion, no modification to the existing generating unit is necessary. Indeed, the cleaning of the coal per se will generally produce benefits in terms of greater efficiency and less wear and tear on plant equipment. The primary disadvantage is that at least for physical coal cleaning, there is an economic tradeoff between amount of sulfur removed and amount of energy lost, resulting in economic sulfur reductions of between 20 and 40 percent.

Part of the coal currently burned in utility boilers is already clean to some degree. However, much of that cleaning is done for ash and rock control, and is not aimed at sulfur control. If coal cleaning efforts were focused on sulfur control and widened, and estimated 1.5 to 2.5 million tons of SO_2 could be removed.

Coal cleaning processes can be divided into three types: (1) physical, (2) chemical, and (3) biological. Conventional physical coal cleaning, which separates coal and its impurities through their different physical properties (such as specific gravity), is the most common form of coal cleaning employed today . . . Compared with current technology, which generally cleans the coal in its lump form (about six inches), . . . advanced physical coal cleaning technologies involve crushing the coal, frequently to pulverizer size (80 percent of the coal under 200 mesh). After crushing, these technologies separate (out) about 80 percent of the pyritic sulfur in the coal . . .

. . . Physical coal cleaning only removes pyritic, or inorganic, sulfur from the coal . . . A variety of chemical and biological processes are being developed to remove organic sulfur. Most of the chemical cleaning processes involve use of an alkali-based process to remove the organically-bound sulfur. Biological processes involve developing "bugs" which will eat the sulfur from the coal . . .

Combustion technologies

Combustion technologies cover a range of reduction techniques, from incremental modifications such as overfire air for NO_x control to redesigned boilers for fluidized bed combustion. Generally for SO_2 control, these technologies use a reagent (or sorbent), such as lime or limestone, to react with the sulfur; the resulting byproduct is then captured and disposed. For NO_x control, these technologies generally control combustion temperatures and the availability of air to prevent the formation of NO_x in the boiler.

Combustion technologies fall into two categories: (1) those which modify the existing boiler for sorbent injection, and (2) those which involve major modification or replacement of the existing boiler with a different combustion configuration. In the first category, the technology being most actively pursued by the government (particularly the Environmental Protection Agency) is Limestone Injection-Multistage Burners (LIMB). LIMB incorporates two advances in technology: (1) lowering NO_x emissions and combustion temperatures by providing additional combustion air around the coal injection port (low-NO_x burner), and (2) lowering SO_x emissions by injecting sorbent (either with the coal or through tertiary air ports) into the furnance (limestone injection). LIMB retrofit demonstrations in Canada and West Germany have resulted in SO_2 and NO_x reductions of about 50 percent. Development efforts in the United States have slowed considerably under the current Administration.

Fluidized Bed Combustion (FBC), either atmospheric or pressurized, falls into the second category of combustion technology. In a fluidized bed boiler, air is forced through the fuel at 4 to 12 feet per second (fps) to support the weight of the fuel particles. At between 1450–1700 degrees F, the bed of fuel particles becomes fluidized and takes on the properties of a liquid. Coupled with limestone injection into the bed, fluidized bed combusion can exceed the current NSPS for both SO_2 and NO_x without concern for a coal's ash properties or quantity.

This flexibility in fuel quality is an important advantage to utilities in deciding on future capacity needs or repowering of older units. Indeed, emissions control may not be a serious consideration for utilities choosing fluidized bed combustion in repowering or rehabilitating older units.

Post-combustion technologies

Post-combustion control is the most commonly used SO_2 control method for utility boilers built after 1978. Flue gas desulfurization units (FGD), or scrubbers as they are commonly called, are very efficient at removing high percentages (90 percent or more) of the SO_2 emissions from a boiler's stack gases. However, they are considered somewhat expensive, particularly in retrofit situations.

Much of the current research in post-combustion technology involves developing more efficient FGD for new construction or techniques to improve the efficienty of current FGD units. Research in these areas includes the use of additives in existing systems and development or advanced FGD units and simultaneous SO_x and NO_x control units for new construction. However, such technology is not primarily focused on retrofit applications.

One post-combustion control technology which may meet the constraints of retrofit application is low-temperature dry injection of reagent into the flue gas before particulate control. Current research on dry injection has generally been on low-sulfur coal units with baghouses. Further research is necessary for potential application on high-sulfur coal units with electrostatic precipitators (ESP).

In summary, this discussion suggests that for existing plants, the list of emerging technologies reviewed above and found appropriate for acid rain control can be divided into three categories depending on the utility's plans for those existing plants. The first category involves new steam generating technologies, such as fluidized bed combustion. Such a retrofit involves a major life extension commitment to an existing facility. Indeed, the decision to use FBC would probably be made on economic grounds, such as additional capacity or fuel flexibility, rather than environmental grounds. The second category involves pre-combustion technologies, such as coal cleaning technology, which provide economic and environmental benefits to a facility regardless of the life extension efforts a utility is intent on pursuing. Finally, there are the strictly control technologies, such as LIMB or dry injection, which may provide low-cost emissions reduction in retrofit applications, but provide no specific economic benefit to utilities under current regulations . . .

Legislative Proposal.—Before turning to the specific provisions of the proposed legislation, several general principles must be recognized. First, there is adequate, cost-effective technology available today to achieve the 12 million ton SO_2 reduction mandated by the new part E of the reported bill. A combination of fuel switching and scrubbing (with a continuation of modest reductions through coal cleaning) can be put in place within the timeframes specified in the proposed part E. The clean coal technology demonstration program authorized by the proposed part F may enhance the availability of other alternative control strategies, but it is not expected that these alternatives will be dramatically more cost-effective or provide significantly greater reductions than can be accomplished with proven systems.

The Committee includes a clean coal program in part to honor the U.S. commitment to our most important partner in the community of nations, in part of achieve a near-term reduction in SO_2 emissions, and in part to gain significant commercial experience with pollution control technologies which have been demonstrated at the pilot scale. Inclusion of this clean coal technology grant program is, thus, not viewed as a solution to the "switching-scrubbing" dilemma that troubled the Envoys. No such dilemma exists. Scrubbers are already in wide use and providing cost-effective reductions in SO_2 emissions at powerplants in the United States. West Germany recently mandated installation of scrubbers at all of its powerplants to address the acid deposition problem there. Furthermore, significant reserves of low-sulfur coal are available in eastern regions of the United States to support a modest fuel-switching option which provides flexibility that can reduce costs in a national acid deposition control program.

Second, a clean coal technology program of the type recommended by the Envoys can only be implemented hand-in-hand with a control program for the precursors of acid deposition. Without the control program there is, in fact, no market for the technologies which will be demonstrated (with the possible exception of some repowering technologies like FBC). There would be no point in spending billions to demonstrate these technologies for retrofit on existing power plants, unless the Congress amended the Clean Air Act to require existing facilities to reduce emissions.

Third, the program authorized here is not simply an extension of the Clean Coal Technology program currently managed by the Department of Energy. This is a new and separate program. The criteria and direction given by the Congress for the existing program are not compatible with the goals and criteria included in the Envoys' report. The existing program is only authorized to spend $750 million. The program authorized here—at $2.5 billion over 5 years—is in addition to, and apart from, that authorization.

Finally, it is not intended that this program (to demonstrate technology which can be retrofitted at existing power plants to control the precursors of acid deposition) will displace or undercut long-term DOE fossil fuel research (to encourage the utilization of domestic coal reserves in place of imported energy). Coal gasification and liquefaction are promising technologies which may offer significant and clean fuel supplies into the distant future. However, they are not likely to be economic as retrofits to existing power plants and, thus, are not likely to make any contribution to resolution of the acid deposition problem. Demonstrating technologies to achieve significant near-term reductions in the emissions of air pollutants which are precursors of acid deposition is the purpose of this program.

Findings.—The new part F adds a section 190 to the Clean Air Act stating the findings of the Congress which warrant creation of a new clean coal technology demonstration program. Generally, these findings follow the major conclusions of the Joint Report issued by the Special Envoys:

—acid rain is a serious environmental problem in both nations;

—air emissions from industrial and mobile sources are the cause of the problem;

—air pollution moves across the U.S.-Canadian border in both directions causing damage sufficient to prompt diplomatic as well as environmental problems;

—both the United States and Canada have made commitments to assure that activities within their jurisdiction do not cause damage in other nations;

—the U.S. and Canada have worked jointly and successfully to solve other environmental problems in the border region;

—the recommendations of the Special Envoys provide an appropriate near-term component to a long-term acid deposition control strategy; and

—clean coal technologies meeting the criteria established by the Envoys are available and can be deployed on a cost-effective basis to significantly reduce transboundary pollution in the near-term.

Policy.—The new part F is a legislative embodiment of the recommendations of the Special Envoys. It is designed to gain further commercial-scale experience with technologies which are now available to control emissions of sulfur dioxide and nitrogen oxides from powerplants and industrial facilities. Deployment of these demonstration projects also will achieve significant near-term reductions in the transboundary movement of pollutants which are the precursors of acid deposition from areas within the United States to areas within Canada. In addition to the clean coal technology demonstration program, the Envoys recommended two other steps which might contribute to a reduction in transboundary pollution and improve relations between the two nations. Each of these other steps is incorporated in section 191, establishing additional policies with regard to transboundary pollution. First, the Administrator is to vigorously enforce existing provisions of the Clean Air Act so as to achieve near-term pollution reductions. For example, such enforcement actions might be taken with respect to tallstack regulations, international and interstate pollution control provisions under sections 115 and 126, and averaging times for determining compliance with National Ambient Air Quality Standards for sulfur dioxide under sections 109 and 110.

Second, the Secretary of State is directed to establish a bilateral advisory and consultative group to provide a forum for direct discussion of transboundary air pollution issues between the environmental and diplomatic officials of the two nations. This consultative group was convened in 1986.

Definitions.—The reported bill adds a new section 192 to the Clean Air Act providing definitions for terms used in the statutory language. The terms defined are "clean coal technology", "coal", "conventional technology", "high-sulfur coal", "precursors of acid deposition", "clean coal technology projects", and "Secretary".

The distinction between a clean coal technology and a conventional technology is one of availability. Clean coal technologies eligible for support under this part are not currently in widespread use at commercial scale in the United States. Only technologies which will achieve a significant reduction in emissions of sulfur dioxide or nitrogen oxides from coal combustion in the generation of electricity or industrial process steam are included. These technologies may be located at either new or existing facilities.

A clean coal technology "project" is limited to the design, construction and operation of equipment and facilities directly associated with pollution control. It does not include equipment and basic facilities (like turbines, cooling towers, transmission lines) that would otherwise be constructed to generate electricity or process steam. In the case of technologies which modify the combustion process, a project may include construction and installation of a new boiler, but that would not be the case for projects focused on pre- or post-combustion control. The Government is not to support expenditures which have only a tenuous connection to the demonstration of pollution control systems and strategies.

Program.—The reported bill adds a new section 193 to the Clean Air Act which provides the basic authority and establishes conditions and limitations on the implementation of a clean coal technology demonstration program. The program is to be conducted jointly by the Secretary of the Department of Energy and the Administrator of the Environmental Protection Agency. To facilitate joint action, DOE and EPA may wish to establish a joint staff unit to administer the program which would fully incorporate the expertise of both agencies. The funds authorized are to be appropriated neither to DOE nor to EPA, but to an account which can only be obligated through joint action by the heads of both agencies. The authority for the Secretary's participation in the program rests in part on the Federal Nonnuclear Energy Research and Development Act of 1974 which includes significant provisions on patents and technology dissemination which are incorporated by reference into this program. EPA is presently conducting research in combustion and post-combustion technologies used in retrofit applications. The expertise of EPA in their existing research programs should be utilized in the clean coal technology program authorized here.

The purpose of the program is to gain national experience (which is transferable from the project sponsors to other entities) with the operation of clean coal technologies at commercial scale. The supported projects may be installed at electric utility generating stations or at industrial facilities producing on process steam.

Financial support may be provided through grants, contracts or cooperative agreements.

The program is to include several identifiable elements and phases (solicitation; selection; supervision; monitoring; and information exchange). Some of these elements are discussed below. The purpose of government support is to produce information on the operating efficiencies and parameters of these technologies. No claim for trade secret protection or confidentiality of business information would be appropriate in the context of this program. DOE and EPA are to jointly issue regulations within 180 days providing for implementation of each element or phase of the program.

Solicitation and Application.—The schedule for implementing the clean coal technology program authorized under the new part F has been structured carefully to assure that results of the demonstration projects are available for use in selecting control strategies to achieve the 12 million ton reduction in sulfur dioxide emissions and the statewide average limitations on emissions rates of sulfur dioxide and nitrogen oxides as required by the new part E. The target dates for reaching the SO_2 and NO_x reduction goals in part E have been set (and deferred from dates contained in the introduced bills) to assure that the results of clean coal technology demonstrations will be useful to the regulated community in meeting the requirements imposed pursuant to the new part E. However, assuring that the two parts work effectively together will require that the various phases of part F be conducted expeditiously.

Program opportunity notices soliciting proposals from potential project sponsors are to be made on two occasions, the first 210 days after enactment, with a second solicitation 21 months after enactment. Potential project sponsors are given only 30 days to submit applications. Although this seems a short period of time, applications were accepted during a period lasting only 60 days for the 1986 solicitation under the current DOE CCT program. And a good deal more experience and information will be available in advance of the additional solicitations authorized here. EPA and DOE are to select projects within 90 days. The project sponsor must assure as part of the application that the project will be constructed and in operation not later than 36 months after selection. Under the current DOE program, the Department may spend several months negotiating with the sponsors of the projects which have been tentatively selected before a final contract to support the project is signed. This occurs in part because the original applications provide only minimal information and specification on the proposed project. Assuring that the schedule contemplated by the new part F is met will require more thorough specification of the proposals in the applications and more expeditious negotiation between the Government and the project sponsors than occurs under the existing program. The completeness of design specifications in the project applications will become one of the criteria on which proposed projects are judged for selection, as only projects which can be in operation within 36 months are to be selected.

Selection Criteria.—Subsection (d) of the new section 193 establishes the criteria which are to be used by the Secretary and the Administrator in selecting projects for funding. Generally, these criteria follow the recommendations made by the Special Envoys. All projects must provide for demonstration of the technology at commercial scale.

The first criterion is that the technologies demonstrated would be appropriate for retrofit on a significant number of existing coal-fired sources of SO_2 and NO_x. Most of the pre- and post-combustion technologies discussed in the 1985 CRS paper quoted above meet the retrofit criterion. However, in the area of new combustion technologies there is substantial doubt whether some of the repowering systems would have significant potential for retrofit. It is likely that LIMB would have wide application and that AFBC may be an appropriate modification to facilities of modest size (in the 50 to 150 MW range), but other technologies, including gasification and liquefaction technologies, would most certainly not have a place in the retrofit market.

The second criterion is that the projects selected contribute to the reduction in transboundary movement of air pollutants which are precursors of acid deposition. This criterion suggests that selected projects will generally be sited in regions nearer the U.S.-Canadian border and upwind from the extremely sensitive aquatic resources located in eastern Canada. It is to be emphasized that a fundamental purpose of this program is to improve relations between the two nations through near-term reductions in transboundary pollution and, thus, projects located in the southeastern United States would be less likely selected (other things being equal) than projects in the Ohio River Valley. This criterion would also indicate that projects which reduce emissions from existing sources are to be preferred over projects conducted at new facilities (even if the technology installed at a new facility is available for retrofit) because the new facility would have to comply with NSPS in any event and thus no reduction in actual transboundary pollution would be realized.

The third criterion is a cost-effectiveness test. It provides that the technology will either offer significant reductions in SO_2 or NO_x emissions (70-90 percent) or if lesser reductions are achieved (20-40 percent), that the cost per ton of reduction will be substantially less than conventional technology. Technologies like LIMB which achieve moderate (50 percent) reductions in emissions of both SO_2 and NO_x would satisfy this criterion, as well.

The fourth criterion requires that the technology be at least as cost-effective as existing control strategies. Currently conventional technology like scrubbers can be installed on a retrofit basis for a capital cost of $200-250 per kilowatt and, including operating costs, can achieve SO_2 emissions reductions which range between $400 and $1,000 per ton removed annually.

Finally, projects must be located in the United States and use feedstock coal mined in the United States.

These five criteria are to be observed in the selection of projects to the maximum extent consistent with the conduct of an effective demonstration program. If a proposed project were unable to fully satisfy one criterion (location, for instance) but was in every other way extremely promising, the Secretary and the Administrator may jointly waive that criterion in a specific instance. However, the fundamental objectives of the program are also to be considered and the requirement for retrofit potential (including repowering) should not be set aside under any conditions. Where several competing proposals are equally attractive, priority is to be given to those projects offering reductions at the least cost per ton and which would be available for utilization at facilities using high-sulfur coal. Project selections are to reflect geographic diversity (to the extent consistent with transboundary reductions) and to utilize a broad variety of coal types.

Review by the Administrator.—The program authorized by the new Part E is to be administered jointly by DOE and EPA. To assure that the criteria in the Envoys' report are fully satisfied by each project, the Secretary of the Department of Energy can make no selection of a proposal for assistance until the Administrator determines that the proposed project is in every way consistent with the requirements and objectives of this part.

Prohibitions.—It is not intended that the funds authorized here will be used to construct projects that would otherwise be required by section 110 of the Clean Air Act. The cost of compliance with the Act should fall on those who benefit from the activities which produce emissions subject to control. However, to the extent that a project is required wholly as the result of the new part E, funds authorized here may be used to support construction and operation. It is most likely that clean coal technology projects under this part will be selected and commenced before any specific facility is targeted for reductions under part E. Projects funded here may be counted toward reduction requirements mandated for each State under that part. To assure that no undue manipulation of the project selection process will occur (so as to finance a significant portion of the part E compliance costs of one or a few States), not more than 15 percent of the funds appropriated (counted cumulatively and over the course of the whole program) may be committed to projects in any one State.

Notification.—DOE and EPA are to make decisions on applications within 90 days and to inform all persons submitting applications whether their proposals were accepted or rejected within that period. Project sponsors will in many cases go to significant effort and expense in preparing an application. Even if their project is ultimately rejected, each sponsor deserves a thorough review of its proposal and, in the event a proposal is not selected, some indication from the Government as to the reasons an award was not offered. Reasons for not selecting projects shall be stated in writing and sent promptly to the project sponsors.

Cost-sharing.—Federal funds committed to support a project under this program must be matched at least equally by funds from other sources. This is consistent with the recommendations of the Special Envoys which provide for a $5 billion program—$2.5 billion of which was to come from Federal funds. Each of the nine projects selected by DOE in August of 1986 also includes a private sponsor matching rate of at least 50 percent. A 50 percent match is the minimum acceptable rate. To assure the largest number of demonstrations and the maximum near-term reduction in transboundary pollution, the Secretary and Administrator are directed to seek contributions exceeding 50 percent where possible from project sponsors.

In addition to funds from those who will actually own and operate a facility, support may also be provided from vendors of the equipment to be installed, State governments administering their own demonstration programs, and other persons.

Federal assistance may include support for the cost of operating the facility (in addition to construction costs) for a period of up to two years at the same matching rates.

Under the current Clean Coal Technology program administered by DOE, project sponsors have been expected to reimburse the Federal Government for its grant and contract funds out of the revenue generated by the project over its operating life. A reimbursement requirement is specifically rejected by the statutory language of the new part F.

Further Provisions.—Subsection (i) of the new section 193 contains several restrictions and conditions on Federal funding for clean coal technology projects supported under this program. These provisions have their precedents in conditions placed on the existing DOE program by the 1986 Continuing Resolution (P.L. 99-190). Notwithstanding the provisions of the Federal Nonnuclear Energy Research and Development Act, which provides underlying authority for DOE participation in this program, title to the facilities and equipment acquired through any clean coal technology project may be vested in the project sponsor rather than the United States Government. The (at least) 50 percent cost-sharing required by project sponsors (or other non-Federal parties) must be provided pro rata over each phase of the project from design to operation, to assure that the Federal Government is not "front-ending" a project which cannot be carried to a successful conclusion. Cost overruns may occur (as these are demonstration projects) and the Government may share in defraying unanticipated costs, but the Government share will not exceed 50 percent of the total cost of the project which (for purposes of determining the limitation on a Government award) cannot be greater than 125 percent of the projected cost at the time the original commitment was made. Matching funds from the project sponsor (or other non-Federal entity including a State or local government) cannot include Federal funds from any other source. This prohibition does not include the proceeds from any bond issuance, the interest on which is exempt from taxation pursuant to section 103 of the Internal Revenue Code of 1986. The project sponsor may provide the matching contribution in-kind, but existing equipment, facilities and supplies or previous research and development expenditures are not to be counted as part of the project sponsor's share.

Reconstruction.—Major stationary sources of sulfur dioxide or nitrogen oxide emissions which are substantially modified (capital investment exceeding 50 percent of the fair value of the facility) may be subject to new source performance standards under section 111 of the Clean Air Act. NSPS requires that emissions of SO_2 be not greater than 1.2 lbs. per million Btu of heat input and that controls achieve a percentage reduction of 70 to 90 percent (depending on the sulfur content of the original fuel).

Some of the projects funded under the demonstration program authorized here would qualify as reconstruction under section 111 definitions and would trigger the NSPS requirement. However, since these are demonstration projects it may be that a sufficient percentage reduction to satisfy the requirement will not occur in every instance. To assure that demonstration projects do not violate the new source performance standards of section 111, subsection (j) of the new section 193 provides an exemption from the NSPS requirements, but only for plants which would be classified as new as the result of reconstruction expenditures supported by a grant, contract or cooperative agreement made under this part. This exemption is intended to encourage full exploration of all alternative technologies.

Advisory Committee.—The reported bill adds a new section 194 to the Clean Air Act directing the Secretary of the Department of Energy and the Administrator of the Environmental Protection Agency to establish a 15-member advisory committee on clean coal technology to review and make recommendations on the administration of this program. The advisory committee results from a recommendation by the Special Envoys to establish a joint Federal-

State-Canadian panel to administer the clean coal technologies program. The panel created here is only advisory in nature, with actual program responsibilities delegated jointly to the Secretary and the Administrator.

The panel is to include the representatives of State and local governments or interstate or regional planning organizations with air pollution control responsibilities. These individuals are to have expertise in the establishment and operation of programs to control the emissions of sulfur dioxide and nitrogen oxides. The members of the panel should reflect a balance of representation from those areas of the Nation with sensitive resources at risk from acid deposition and those areas contributing to the atmospheric loading which is causing the damage. The State officials may include individuals who administer clean coal technology demonstration programs at the State level. For instance, both Ohio and Illinois have established significant efforts in this area.

DOE and EPA are each to appoint five of the State and local representatives to the panel. In addition the advisory committee will include three members named by the head of Environment Canada. These individuals may be Canadian government officials, Canadian citizens or American citizens representing Canadian interests. The other two members are the designees of the Secretary (DOE) and the Administrator (EPA).

The members of the advisory committee will serve for a term of three years and are eligible for reappointment. DOE will provide support services for the committee. Members are to be compensated for their service on the committee. The automatic termination provisions of the Federal Advisory Committee Act shall not apply to the activities of the committee.

It is expected that the advisory committee will be given a significant role in the oversight of this program. Proposed regulations and solicitation notices should be reviewed by the panel before issuance. Applications should be made available to panel members for comment (by the members individually or the panel as a whole) before selections are made. And contracts with the sponsors of selected projects should be reviewed for comment (by members individually or the panel as a whole) before any commitment is made to a specific project by the Government.

Authorizations.—The reported bill adds a new section 195 to the Clean Air Act authorizing the appropriation of $500,000,000 in each of the five fiscal years from 1988 through 1992 to carry out the clean coal technology demonstration program. This is the same amount as was recommended by the Special Envoys and is consistent with the Administration's revised budget request, both as to amount and timing. These sums are to be in addition to and apart from those available through the Clean Coal Technology Reserve established by Public Law 98-473. No condition or restriction placed on the use of CCT Reserve funds shall apply here unless specifically stated in this part.

The funds provided shall be divided between projects selected during first and second round solicitations. If satisfactory proposals are received in the first round, the Secretary and the Administrator may commit more than one-half of the fully authorized amounts to projects selected in the first round. This will facilitate availability of operating data and results for use by utilities and industrial sources selecting control strategies to meet the requirements of the new part E.

ROLLCALL VOTES

Section 7(b) of rule XXVI of the Standing Rules of the Senate and the rules of the Committee on Environment and Public Works require that any rollcall votes taken during the committee's consideration of the bill be noted in the report.

Several rollcall votes were taken, the results of which were publicly announced during the open meetings held to consider this bill. The tabulation of those votes is available from the committee's files.

On October 22, 1987, the committee ordered the bill reported by a vote of 14 to 2 with Senators Burdick, Moynihan, Mitchell, Baucus, Lautenberg, Breaux, Mikulski, Reid, Graham, Stafford, Chafee, Simpson, Durenberger, and Pressler voting to report the bill. Voting in the negative were Senators Symms and Warner.

EVALUATION OF REGULATORY IMPACT

Section 11(b) of rule XXVI of the Standing Rules of the Senate requires publication in the report of the committee's estimate of the regulatory impact made by the bill as reported. That estimate follows:

Much of the bill imposes requirements which are already within the discretion of the Administrator of the Environmental Protection Agency. Many provisions are in fact necessitated by the failure of the agency and others, to completely execute the existing requirements of law.

Some provisions of the bill will incrementally increase the burden of regulation on industry. Few of these industries, however, are not already subject to Federal or other regulation. These provisions, and the requirements for State and local governments, are discussed extensively in the "Discussion of Intent" above. The bill should result in no changes with respect to the privacy of individuals.

COST OF LEGISLATION

Section 403 of the Congressional Budget and Impoundment Control Act requires that a statement of the cost of the reported bill, prepared by the Congressional Budget Office, be included in the report. That statement follows:

SMELTER CONTROLS

SUMMARY

The reported bill repeals section 119 of the Clean Air Act, eliminating the authority to issue primary nonferrous smelter orders postponing compliance with State implementation plan requirements for such smelters. Any orders issued under section 119 are terminated as of January 1, 1988. No administrative order under section 113 or other provision of the Clean Air Act, and no court order, may permit any extension or delay in compliance beyond January 1, 1988.

DISCUSSION

As of the 1977 amendments to the Clean Air Act, many copper smelters were still out of compliance with requirements of State implementation plans intended to bring affected areas into compliance with national primary and secondary ambient air quality standards for sulfur dioxide. Section 119 was included in the Act in the 1977 amendments to provide a specific set of conditions under which postponement of compliance with such requirements could be allowed. By the terms of section 119, no primary nonferrous smelter order could provide for a postponement of compliance beyond January 1, 1988.

By 1987, nearly every copper smelter has either come into compliance or discontinued operations. Because smelters with insufficient controls are massive sources of sulfur dioxide, it is appropriate as part of a bill establishing controls on precursors of acid deposition to repeal delayed compliance opportunities for smelters. The practical consequences of this repeal will be limited, however, since smelters will generally be in compliance with emission limitations by January 1, 1988. The bill also assures that no other extension or postponement of compliance can be provided, either administratively under the Clean Air Act or by a court under any authority.

INTERNATIONAL COOPERATION

SUMMARY

This section directs the President to initiate tripartite negotiations with Canada and Mexico not later than April 1, 1988 for the purpose of creating an international framework to control sources of transboundary air pollution and related control mechanisms.

DISCUSSION

This section recognizes the continental aspects of transboundary air pollution and directs the President, through the process of tripartite negotiation with Canada and Mexico, to establish a framework to control sources of transboundary air pollution. The purpose of this section is to establish an international framework with Canada and Mexico to minimize existing and projected levels of air pollution by creating a North American air quality monitoring network and encouraging increased research and dissemination of information on air pollution control strategies. Through the process of negotiation, the development of uniform minimum levels of protection for public health and the environment is encouraged and application of uniform standards of performance for air pollution control should be established.

This provision is designed to assure that both Canada and the United States shall bear their fair share, on a percentage basis, of any overall reductions contemplated by the agreement. Precisely how each side meets its reduction levels, how the overall reductions are allocated among particular sources, and how each country finances its reduction program, should be left to each country to determine.

The subsection notes that the means of achieving comparable reductions in Canadian emissions may include the appropriate installation of technological systems of continuous emissions control. Experience in the United States and Canada demonstrates that certain technological systems of emissions control, such as pyrrhotite ejection, acid gas capture, or flue gas desulfurization are capable of providing a degree of assurance that the contemplated levels of emission reductions will be achieved. The President should seek to have Canada consider, in the development of its emission control programs, the use of some of these methods, or other advanced technological systems now under development.

The Committee heard testimony addressing the effects of transboundary air pollution. Witnesses expressed concern regarding the level of commitment to pollution control and the actual levels of emission reduction achieved by foreign air pollution control programs. Several witnesses observed that reliable, standardized and verifiable information which accurately documents the level of air pollution attributed to transboundary sources is lacking.

Subsection (c) directs the President to seek in negotiation with Canada, that comparable levels of sulfur dioxide reductions to those undertaken by the United States under Part E of Title I of the Clean Air Act are effected in Canada, including the installation of technological systems for continuous emission reductions. While the sources of acid precipitation precursors in eastern Canada and the eastern United States are well documented, the effect of air pollution emissions on visibility in western Canada and the western United States is also a matter of concern. This section seeks to specifically include the provinces of western Canada in the adoption and implementation of any transboundary air pollution control program. It also encourages the adoption of transboundary air pollution reduction levels comparable to reduction levels in the western United States, particularly emissions from coal-fired power plants in western Canada. Additional monitoring of these emissions is necessary to determine the extent of their impact upon visibility and air quality of National Parks and Class I air quality areas in particular.

The bill includes an amendment concerning the air pollution emissions of Northern Mexico which affect wide areas in the American west. Existing visibility and air quality monitoring in southwestern United States must be augmented to gather data needed to better understand the nature, magnitude, extent, duration and frequency of transboundary air pollution effects from smelters and industrial areas in Mexico on National Parks and Class I areas in the United States. The monitoring program should be designed to provide data to determine the chemical composition and strength of emissions from Mexican sources and to estimate the level of emission reductions needed to mitigate or eliminate transboundary effects. A multi-year program, including at least a year of data collection followed by data analysis, is needed.

EMISSION TARIFF STUDY

SUMMARY

Not later than January 1, 1989, the Secretary of the Treasury, after consultation with the Administrator of the Environmental Protection Agency, shall submit a study, together with appropriate legislative proposals, on a system of tariffs on emissions adequate to encourage reductions in emission in precursors of acid deposition and other forms of environmental pollution. This study and the accompanying recommendations are to be submitted to the Committees on Finance and Environment and Public Works of the Senate; and, the Committees on Ways and Means, Energy and Commerce and Public Works and Transportation of the House of Representatives.

DISCUSSION

The purpose of this amendment, which is consistent with United States obligations under the General Agreement on Tariffs and Trade, is to assure that the environment of this and other countries is protected against the injuries caused by environmental pollution generally and the precursors of acid deposition specifically.

The Secretary, in consultation with the Administrator of the Environmental Protection Agency, is to determine which nations fail to adequately control air, water or other pollution, using the rules and regulations of the United States as the benchmark. The Secretary should further determine what level of tariffs would be necessary to assure that such nations imposed controls at least as stringent as those applicable to pollution sources within the United States. Such tariffs should not less than the economic benefits derived from the absence of such requirements, and could be more. The recommended level should be that which would be adequate to assure, not merely encourage, the adoption of adequate pollution control technologies by the nations in question. In order for actual reductions to be achieved, the effectiveness of the tariff in terms of assuring the operation and proper maintenance of such controls, together with systems of enforcement, should also be examined.

NATIONAL ACADEMY OF SCIENCES REVIEW OF ACID RAIN RESEARCH

SUMMARY

This section requires that the Administrator contract with the National Academy of Sciences to evaluate and identify the major research priorities needed on the mechanisms and effects of long-range transport of acid rain. The National Academy of Sciences is to prepare an interim report within 90 days and a final report within 1 year. Funding of $1,000,000 will be made available from the fiscal year 1988 National Acid Precipitation Assessment Program.

DISCUSSION

In 1980, Congress authorized a 10-year study of the effects of acid rain. The program known as the National Acid Precipitation Assessment Program was required to issue an interim report to Congress in 1985 and a final year in 1990.

The interim report was issued in September of 1987. The underlying science and collected data upon which the report was based has been well received by the scientific community. The executive conclusions of the report, however, have been criticized as not accurately reflecting the science or the complete data. This amendment would require the National Academy of Sciences to review acid rain research to date, as well as the interim assessment report, and then to make recommendations regarding research priorities in the future.

ACID DEPOSITION STANDARD

SUMMARY

Section 206 of the reported bill directs the Administrator of the Environmental Protection Agency to report to the Congress on the role that an "acid deposition standard" might play in protecting sensitive aquatic and terrestrial resources from the adverse effects of acid deposition. Such a standard might provide an upper limit on the wet sulfate that could be deposited on sensitive watersheds or forested areas in any one year. An acid deposition standard could be implemented under the Clean Air Act much as National Ambient Air Quality Standards are currently implemented. In addition to reporting on the feasibility and effectiveness of such a standard, the Administrator is required to identify the sensitive and critically sensitive aquatic and terrestrial resources in the United States and Canada which might be protected by a deposition standard.

DISCUSSION

Title II of the reported bill adds a new part E to the Clean Air Act to control emissions of the precursors of acid deposition, principally sulfur dioxide and nitrogen oxides. The general structure of that control program is based on the findings of the National Academy of Sciences stated in report entitled, *Acid Deposition: Atmospheric Processes in Eastern North America*, which was published in 1983. Generally, the report was interpreted to indicate that the relationship between sulfur dioxide emissions and acid deposition is linear over the eastern half of the North American continent. One can conclude from that premise that a substantial reduction in SO_2 emissions will lead to a substantial, and nearly equal, percentage reduction in the acid compounds deposited in the northeastern United States and eastern Canada.

Second, the report indicated that a substantial reduction in emissions and deposition is necessary to protect the most sensitive aquatic resources. Witnesses appearing before the Committee have consistently indicated that a reduction in the range of 50 percent in emissions and deposition is necessary to protect the most sensitive resources from further acidification.

Furthermore, the report concluded that it is not possible to precisely target a control program on a limited number of identifiable points of emissions for several reasons. First, the weather patterns over the eastern half of the continent cause sufficient variation in transport and mixing of pollutants, that each source of emissions may adversely affect resources over a large area and, as a corollary, receptors (sensitive watersheds and forested areas) may be affected by several point sources. And second, to the extent that strong source-receptor relationships actually do exist, the science is not sufficiently powerful to sort them out from the general pattern at this time.

Therefore the Committee fashioned a control program calling for substantial reductions distributed according to an equitable formula over a very large area.

But that is not the only possible set of premises for an acid deposition control program. Other nations, including Canada, and some American States, including Minnesota, have built aggressive acid rain control programs on a different foundation. These programs start from an explicit acid deposition standard—a numerical limitation on the watershed or terrestrial loadings of acid compounds—designed to protect the resources most at risk.

The resources of concern are aquatic (lakes and streams) and terrestrial (forests) resources. These resources have some capacity to resist damage from the deposition of acid compounds. This resistance is called "buffering" capacity. The presence of naturally occurring elements like carbonates and calcium in the soil of a watershed can react with the acid compounds to prevent acidification of the water and soil resource. 40 units (microequivalent units of alkalinity per liter) of buffering capacity is considered very low. Resources with buffering capacity below 40 ueq/1 are extremely sensitive to acid deposition. Resources with buffering capacity between 40 ueq/1 and 200 ueq/1 are considered moderately sensitive and subject to damage at existing deposition rates. Alkalinity is chosen from among several other possible indicators because it is a parameter that is now routinely measured by lake surveyors; it can be measured with reasonable accuracy by current technologies; alkalinity is relatively insensitive to contamination; and alkalinity is less subject to daily and seasonal variability that other measures of water quality such as pH.

Acid compounds are deposited in both dry and wet forms. But only wet sulfate deposition is currently measured with reliability. So, the acid deposition standards that have been established are generally expressed as wet sulfate deposition (in kilograms) over a land area (hectare, that is 2.5 acres) over a period of time (one year). The Minnesota standard is 11 kilograms per hectare per year. That standard was established to protect the critically sensitive resources in the Boundary Waters Canoe Area. The Canadian standard adopted to protect all but the most sensitive resources is 20/kg/ha/yr. Deposition rates less than this standard are not likely to result in further substantial acidification of the resources generally at risk.

Implementing such standards can be accomplished in a four step process. First, the buffering capacity of all aquatic and terrestial resources is measured to identify those which may be sensitive or critically sensitive. Second, deposition monitoring is conducted in the area of the sensitive resources to determine whether the standard is being met. Third, and for those resources failing to meet the standard, source-receptor relationships are established which identify those emissions sources or groups of emissions sources which are causing deposition in excess of the standard. Finally, control requirements are imposed on the identified sources to assure that deposition will be reduced to levels below the standard.

Although the control program included in title II of the reported legislation begins from a different set of premises, a deposition standard may nevertheless, and in the longer-term, be useful as an element of the national effort to protect aquatic and terrestrial resources from acid deposition. For instance, the standard may be used after controls are in place as a yardstick to determine whether they are, in fact, sufficient to protect the sensitive and critically sensitive resources at risk.

The reported bill directs the Administrator to conduct a study of the feasibility and effectiveness of an acid deposition standard and to report to Congress, not later than 36 months after enactment, on the role that a deposition standard might play in an acid rain control program.

The report is to include an identification of the sensitive (<200 ueq/1 alkalinity) and critically sensitive resources (<40 ueq/1 alkalinity) in both the United States and Canada. This is to be a detailed listing of the watersheds and forested areas which meet these (or alternative) definitions which identify the resources at risk. The identification of Canadian resources may be based on readily available data compiled by the Government of Canada or other sources and will not require actual survey work. The identification of such resources in the United States is to be a census (not a survey) of U.S. resources that may be adversely effected by acid deposition at current rates.

In addition to the identification of sensitive and critically sensitive resources, the report prepared by the Administrator will also include discussion of: 1) the numerical value(s) that such a standard(s) may take; 2) the use of such standards in the acid rain control programs established by any of the several States or other nations; 3) means to integrate a deposition standard into the structure of the Clean Air Act and the control program established by part E; and 4) the state of knowledge with respect to source-receptor relationships, buffering capacity and other factors which might affect the validity of the standard or the feasibility of its implementation.

TITLE III—MOBILE SOURCES AND OTHER FEDERAL CONTROLS

Vehicle Emission Standards

SUMMARY

The reported bill amends Title II of the Clean Air Act to establish emission standards for motor vehicles more stringent, in many respects, than standards required under existing law or regulation. The following table summarizes the changes made by the bill.

MOTOR VEHICLE EMISSION STANDARDS

	Current law	Clean Air Standards Attainment Act
Autos (light-duty vehicles) (Grams per mile):		
Hydrocarbons (HC)	0.41	0.25 (1992 model).
Carbon Monoxide (CO)	3.4	No change.
Oxides of Nitrogen (NO_x)	1.0	0.4 (1990 model).
Particulates	0.2	0.08 (1990 model).
Light-duty trucks (Grams per mile):		
Hydrocarbons (HC)	0.8	0.5 (1990 model).
Carbon Monoxide (CO)	10.0	5.0 (1990 model).
Oxides of Nitrogen (NO_x)	1.2 (1988 model for smaller LDT's 1.7 (1990 model for larger LDT's).	0.5 (1990 model)
Particulates	0.26 [1]	0.08.
Heavy-duty trucks (Grams per brake horsepower-hour):		
Hydrocarbons (HC)	1.1 or 1.9 (gasoline-powered) 1.3 (diesel powered).	No change.
Carbon Monoxide (CO)	14.4 or 37.1 (gasoline-powered) 15.5 (diesel-powered).	No change.
Oxides of Nitrogen (NO_x)	6.0 (1990 model) 5.0 (1991 model).	4.0 (1991 model). 1.7 (1995 model).
Particulates	0.25 (1991 for other than buses)..	No change.
	0.10 (1991 for urban buses; 1994 for others).	0.10 (1991 for buses; 1994 for others).
Motorcycles:		
Hydrocarbons (HC) (grams per mile)	8.0	2.0 (1992 models less than 700cc) 3.6 (1992 models greater than 700cc).
Carbon Monoxide (CO)	19.3	17.6 (1992 model).
Evaporate hydrocarbons (grams per test)	No standard	2.0 (1992 models less than 700cc) 4.0 (1992 models greater than 700cc).

[1] EPA has proposed a short-term relaxation, then a tightening of this standard for 1991 models.

In addition, the bill clarifies that any vehicle with a gross weight less than 6,000 pounds must meet emission requirements for light duty vehicles and requires the Administrator to promulgate regulations to assure that light trucks are manufactured to meet CO emission standards at high altitudes.

The reported bill also requires the use of technology on vehicles manufactured during and after model year 1991 to control emissions of hydrocarbons during fueling.

The Administrator is required to issue regulations to control emissions of formaldehyde from automobiles, trucks and engines that can use fuels other than gasoline to levels, at a minimum, no greater than formaldehyde emissions from gasoline fueled vehicles.

The bill requires promulgation of regulations to prohibit production or sale of engines that require use of leaded gasoline.

Finally, the bill requires the Administrator to issue regulations requiring that automobiles and light trucks, beginning in model year 1990, be manufactured to achieve a 90 percent reduction in emissions of CO from levels achieved at temperatures between 20 and 68 degrees fahrenheit from model year 1970 vehicles.

DISCUSSION

Current law requires control of emissions of hydrocarbons (HC), oxides of nitrogen (NO_x), carbon monoxide (CO), and particulates from motor vehicles. In addition, regulations promulgated under the Clean Air Act have reduced the lead content of gasoline and thus, emissions of lead from vehicles. While significant progress has been made in reducing emissions of each of these pollutants (other than NO_x) from vehicles over the last decade, problems still remain.

Thus, although emissions of hydrocarbons from all transportation sources (including motor vehicles) have been reduced by 30 percent, carbon monoxide by 25 percent and lead by 88 percent, transportation sources in 1985 were still responsible for 70 percent of CO emissions, 34 percent of HC, 18 percent of particulates, and 45 percent of NO_x nationwide.

Hydrocarbons and NO_x are both precursors of photochemical oxidants which, at ambient levels still experienced in more than 60 urban areas of the United States and in rural areas, as well, cause adverse health and environmental effects. It currently appears that ozone, the pollutant used by the Environmental Protection Agency as the standard for measuring photochemical oxidants in the atmosphere, will continue to be a long-term problem in many of these areas unless significant further reductions in HC and NO_x are achieved.

Health standards for CO continue to be exceeded in 65 areas of the country. Projections by EPA suggest that as many as 15 areas may still be exceeding these health standards in the year 2010.

Revised health-based standards for particulate matter (PM10) were promulgated in June 1987. The Environmental Protection Agency estimates that at least 70 counties and possibly as many as 160, exceed the standard and will be required to reduce particulate emissions in order to achieve healthy air quality. Diesel-powered vehicles contribute a significant portion of particulates found in urban areas, and, because of their small size and the chemicals that may be absorbed onto them, diesel particulates are a special health concern.

While much progress has been made in reducing levels of lead in the ambient air, there is ample evidence that blood lead levels in individuals, especially children, are still a serious problem in this country. Further reductions in emissions of lead, from motor vehicles and from other engines, will contribute to reducing incidences of lead poisoning.

Oxides of nitrogen are problems, not only because they are precursors of ozone but also because they are major contributors to acid deposition and visibility impairment. Emissions of these pollutants have risen by 900,000 tons between 1983 and 1985, with 300,000 tons of this increase attributable to transportation sources.

In view of the contribution of vehicle emissions to persistent air pollution problems in this country, and in view of the expected increases in vehicle miles traveled for the foreseeable future—increases that will quickly overtake the emissions reductions expected from the replacement of older vehicles with new, cleaner ones—tighter emissions requirements for new vehicles are necessary if the emission reductions of the past decade are to be preserved and further progress made.

Requirements for automobiles.—The bill requires that automobiles meet a standard of 0.4 gram per mile (gmp) for NO_x, beginning in model year 1990, a standard of 0.25 gpm for HC in 1992, and a standard of 0.08 gpm for particulates from diesel-powered vehicles in 1990.

With respect to HC and NO_x, approximately one half the models certified to be sold in 1987 met the new standards required by the bill. The State of California (which established emissions standards for vehicles before the Federal Government began to do so, and which retains authority to set its own standards so long as they are as protective of health as the Federal standards) has adopted a standard of 0.4 gpm for NO_x, to be phased in beginning in 1989, at an estimated cost of $25 to $30 per vehicle. California is also considering setting a standard of 0.25 gpm for non-methane hydrocarbons (NMHC) and has testifed that such a standard is feasible, at an estimated cost of $25 per vehicle.

The bill leaves unchanged existing requirements for CO emissions, except that a provision in existing law that permits California to set standards that "in the aggregate" are as protective of public health as Federal standards has been deleted. This provision had allowed California to have a CO standard less stringent than the Federal standard; the change means that cars sold in California must meet the Federal CO standard of 3.4 gpm.

While diesel-powered automobiles currently are only a small fraction of the vehicle fleet—less than one-half of one percent of new cars—history suggests that if energy prices rise, so will the proportion of diesels in the passenger vehicle fleet. Development of the technology to meet the standard of 0.08 gpm in the bill has made significant progress and establishing the standard in law at this time will assure that improvements in durability and performance of the technology will be undertaken in advance of possible increases in the numbers of diesel vehicles on the road. California has already adopted a 0.08 gpm standard, which will go into effect in the State in 1989, one year earlier than required by the bill for the rest of the country.

The bill defines light-duty vehicles for the purposes of complying with emission stands as "any motor vehicle with a gross vehicle weight of six thousand pounds or less". Some vehicles in this category are, under current regulations, not required to meet the standards that automobiles must meet, although they possess very similar characteristics and are used in much the same fashion as passenger autos; they are instead, required to meet more lenient light truck standards. The effect of this disparity is that an increasing number of vehicles have much higher emissions than automobiles. The definition in the bill assures that emissions from vehicles with similar equipment and characteristics are controlled with an equal degree of stringency.

Light-duty trucks.—The bill defines a light-duty truck as a vehicle the gross weight of which is less than 8,500 pounds and curb weight of which is less than 6,000 pounds and which is designed primarily for the transportation of property or twelve or more persons or for off-road use. Emission standards are prescribed as follows: HC, 0.5 gpm; NO_x, 0.5 gpm; CO, 5.0 gpm; and diesel particulates, 0.08 gpm.

Because light trucks are, in most characteristics, very similar to automobiles, standards in the bill, which are adjusted to take into account the heavier weights of trucks, are realistic.

The bill also requires EPA to assure that light-duty trucks and engines manufactured beginning in model year 1990 meet carbon monoxide standards at high altitudes as well as at low altitudes. Existing regulations requires such compliance for automobiles, and the Agency is considering similar regulations for light trucks. The provision in the bill codifies the policy under consideration by EPA in order to help alleviate the serious CO nonattainment problem that exists in many of the high altitude urban areas of the country.

Heavy-duty vehicles.—The bill adopts, for heavy-duty vehicles, certain standards that are already required by EPA regulations. These require that buses meet a 0.10 gram per brake horsepower hour (g/BHP-hr) standard for particulates beginning with 1991 models and that other heavy-duty vehicles meet a 0.25 g/BHP-hr particulate standard in 1991 and 0.10 g/BHP-hr in 1994. The standards are codified in order to establish certainty for the regulated industry as to the level of control it must achieve and the dates by which it must produce engines that achieve those levels.

Analyses show that over the next several years, emissions of NO_x from heavy-duty vehicles will increase (because of the increase in vehicle miles traveled) and will constitute a larger fraction of total NO_x emissions than at present in many areas of the country. The bill tightens the 1991 standard for NO_x in existing regulations from 5.0 to 4.0 g/BHP-hr and requires that the NO_x standard in 1995 and thereafter be 1.7 g/BHP-hr. The 1995 standard represents the 75 percent reduction from uncontrolled levels required by the current Clean Air Act to have been achieved by 1985 (with provision for less stringent interim standards).

Motorcycles.—The bill contains emission standards for motorcycles that are more stringent than those required under existing Federal regulations. The standards are as follows: 2.0 gpm for HC from models less than 700cc; 3.6 gpm for HC from models equal to or greater than 700cc; and 17.6 gpm for CO from all models, beginning in model year 1992. Standards for evaporative emissions are set at 2 grams per test for models less than 700cc and 4 grams per test for models equal to or greater than 700cc.

Analysis of certification data show that most models are already meeting the standards set in the bill, so that little, if any, additional controls will be required for most models. The new standards are slightly less stringent than those currently required by California for HC and evaporative emissions and 12 percent more stringent than California standards for CO.

Onboard hydrocarbon control technology.—The 1977 amendments to the Clean Air Act directed the Administrator to "determine the feasibility and desirability of requiring new motor vehicles to utilize onboard hydrocarbon control technology" and provided the Administrator authority to require the use of such technology.

The Agency, in a document published in 1980, tentatively determined that onboard controls for light-duty vehicles were technically feasible, but in 1981 the Agency announced that onboard controls would not be required at that time. The announced reason for the decision not to require the controls was the financial plight of the automobile industry.

The Agency has since reconsidered requiring onboard controls and on August 19, 1987, published in the Federal Register a rule proposing to require such controls on all gasoline-fueled motor vehicles. In its preamble to the proposed rule the Agency describes in detail the extent of the ozone nonattainment problem in the United States, the outlook for the problem to get worse in the next 20 years if further control of hydrocarbon emissions are not required, the benefits to public health from reducing exposure to toxic gasoline vapors during vehicles refueling, and the cost effectiveness of onboard controls as a means of reducing hydrocarbon emissions.

While the Agency has proposed regulations for onboard controls, there is no time by which the Agency must make final its proposed regulations, nor do the proposed regulations provide a specific deadline for manufacturers to begin to produce vehicles that incorporate refueling controls. The Agency notes that it would not be feasible to require onboard controls in less than two model years after promulgation of regulations.

To assure that the needed controls are employed in a timely fashion, the bill requires that, beginning in model year 1991, all vehicles be equipped with onboard control for hydrocarbons and that the controls be designed for use with all available fuels. Inclusion in the bill of a specified deadline will eliminate the prospect of further delays in the 10-year effort to control one significant source of pollutants that contribute to ozone formation and toxic air pollution.

Formaldehyde emissions.—Aldehydes, including formaldehyde, are one class of hydrocarbons emitted from gasoline-powered vehicles. Formaldehyde can cause a number of acute health effects such as eye, nose, throat and skin irritation, headaches and nausea, and, at high enough concentrations, death. The Environmental Protection Agency has classified formaldehyde as a probably human carcinogen.

Aldehyde emissions are higher from vehicles using alcohol fuels or alcohol/gasoline blends than from gasoline, alone. Because aldehydes are more toxic and more reactive than many other classes of hydrocarbons, it is important to assure that they are well-controlled in all vehicles.

The bill requires that the Administrator issue regulations to limit formaldehyde emissions from vehicles using fuels other than gasoline to levels that, at a minimum, are no higher than emissions from gasoline-fueled vehicles.

Lead emissions.—The adverse effects of lead on human health, especially its effects on children, are well-documented. Evidence is mounting that adverse effects, including effects on the central nervous system and decreases in cognitive ability, may be experienced at levels of lead contamination that were previously thought to be safe.

Lead emissions from motor vehicles have been dramatically reduced as regulation by EPA has lowered the lead content in gasoline. Lead has not been eliminated from gasoline because of the existence of engines that require some lead in fuel to function properly over time.

While all engines for motor vehicles currently being produced are designed to run without lead in fuel, other engines—for example, farm machinery and small gasoline-powered equipment—are not necessarily so designed.

In order to facilitate the total ban on lead in gasoline, the bill requires the Administrator to issue regulations prohibiting the manufacture or sale after model year 1991 of any engine that requires the use of leaded gasoline.

Carbon monoxide emissions at cold temperatures.—Emissions of carbon monoxide from motor vehicles are higher under cold temperature conditions than under warmer conditions. Emissions are highest when ambient temperatures are low and the vehicle engine is cold, the so-called "cold start" condition.

Currently, EPA certifies vehicles at a temperature range of 68 to 86 degrees Fahrenheit. Certain control systems that reduce CO emissions by 90 percent at these temperatures are not necessarily effective at lower temperatures. Analyses show that over the last five years the average temperature during CO violations nationwide was 45 degrees Fahrenheit, and less than 12 percent of all violations of the CO standard occurred at temperatures within the certification range. Technology to improve CO emissions control performance at colder temperatures is currently in use on many vehicles and is available for the entire automobile and light truck fleets at reasonable cost.

The bill requires that EPA augment its regulations applicable to emissions of CO from cars and light trucks to require a 90 percent reduction below emissions from 1970 model year levels at temperatures between 20 and 68 degrees Fahrenheit. The 90 percent reduction level at 20 degrees is calculated to be 6.2 gpm. The bill does not specify the method to be used by EPA to assure compliance with the requirement and does permit the testing of randomly selected vehicles as an acceptable compliance strategy.

ASSURANCE OF IN-USE COMPLIANCE

SUMMARY

The reported bill amends several provisions of the Clear Air Act that are related to the performance of vehicle emission control systems throughout their lifetimes. The bill amends section 202(d)(1) of the Act to extend the definition of "useful life" for light-duty vehicles from 5 years or 50,000 miles to 10 years or 100,000 miles, beginning with the 1990 model year.

Title II of the Act is amended to modify current practices in the certification process by (1) prohibiting averaging among engine or vehicle families or models or among vehicle classes as a means for a manufacturer to comply with emissions standards, and (2) requiring that an idle mode test element be added to the Federal Test Procedure.

The reported bill increases from 60 percent to 90 percent the portion of production line vehicle of a particular model that must comply with emission standards when tested, in order for that model to be sold.

One provision of the bill makes several changes to section 207(c) of the Act which deals with in-use surveillance and recalls of vehicles: (1) vehicles must be "normally" maintained rather than "properly" maintained, as under existing law, and "normal" maintenance is defined as that which is "ordinarily to be expected in the hands of the ultimate purchasers, not necessarily in accordance with instructions" issued by the manufacturer; (2) the Administrator is required to take into account information from States that have I/M programs in determining that a particular vehicle model does not conform to standards, and the Administrator is required to respond within 60 days to a petition from a State with an I/M program for a determination of nonconformity; and (3) EPA is required to establish a testing center for in-use surveillance of vehicles under high altitude conditions.

Section 203(a)(3) of the Act is amended to prohibit an individual from removing or rendering inoperative any component of a vehicle emission control system after its sale to an ultimate purchaser and to make illegal the manufacture or sale of devices that render such a component inoperative. The bill also amends section 205 of the Act to permit the Administrator to assess civil penalties against any person who performs an act prohibited by section 203(a) of the Act.

The warranty provisions of the Act are amended to specify the components of emission control systems that are covered by the defects and performance warranties in section 207(a) and 207(b) of the Act, respectively. This provision also requires the Administrator both to issue regulations for States with I/M programs to assure that those programs detect and report patterns of defects in a manufacturer's emission control systems and to report annually to Congress any findings of such defects and efforts undertaken to correct them. The bill also strikes, in section 207(c)(3) of the Act, all exceptions to the provision prohibiting a manufacturer from requiring that proper maintenance be performed by a particular kind of establishment or using only specified parts. The bill requires manufacturers to display the costs of the defect and performance warranties on each new vehicle and directs the Administrator to verify those costs. Displayed on each new vehicle must also be a notice that the consumer has no obligation to buy extended warranty coverage beyond that required by the Act and may elect to purchase any additional warranty from any vendor.

DISCUSSION

The real measure of the effectiveness of a vehicle emission control program is the performance of vehicles in actual use. The certification requirements of the Clean Air Act are intended to assure that a prototype for a particular vehicle model achieves the emission characteristics and durability required by law, but do not guarantee performance of mass-produced vehicles once they are on the road. Certain aspects of EPA's current certification procedures do not achieve maximum emission reductions from vehicles in use, and the bill requires modifications in these Agency practices, as described below under the headings "Emission Averaging" and "Idle Test Mode".

In addition to certification requirements, the Act authorizes the Administrator to determine whether vehicles in production and in actual use meet emissions standards, and requires manufacturers to provide warranties to cover the cost of correcting defects or performance failures in emission control systems. Each of these authorities is intended to achieve maximum compliance by vehicles in-use with statutory emission standards.

Analyses show that late model cars, in actual use, emit approximately twice the HC levels required by the standard and almost three times the CO emission standard. Until these in-use levels can be brought down, the benefits of the Federal motor vehicle standards program cannot be fully realized. In order to improve the effectiveness of authorities already in the Act, this section requires changes in the acceptable quality level criterion for production-line testing required by the Agency, in the provisions of law relating to the recall of vehicles in-use that are not meeting emission standards, and in the warranty provisions of the Act. These changes are also described below.

Definition of "useful life."—As the most direct means of improving in-use performance of automobiles, the bill increases from 50,000 miles or 5 years to 100,000 miles or 10 years the definition of the term "useful life" for light-duty vehicles.

The concept of useful life is used in three elements of the Federal motor vehicle pollution control program: in setting the durability standards for certifying a vehicle model; in establishing the period of coverage of manufacturers' warranties; and in establishing the period during which vehicles families are subject to recall for failure to conform to emission standards.

By changing the statutory definition from what is actually only about one-half the useful life of most cars to a period that covers the expected use of the vehicle, the bill enhances the likelihood that emission control systems will be designed and produced to work effectively throughout the time the vehicle is being used.

Emission averaging.—Under current regulations EPA permits manufacturers to certify compliance of vehicles with certain emission standards by averaging across engine families or between classes of vehicles. This averaging, though inconsistent with the current statute, is currently permitted by regulation in determining compliance with particulate standards for light-duty vehicles and light trucks and for heavy-duty vehicles, and with NO_x standards for all classes of trucks and heavy-duty engines.

Because resources are not available to allow emissions standards to be set for each and every type of engine and vehicle, standards represent levels of control that can be achieved by an entire class of vehicles, e.g., by all automobiles or all light trucks. Thus, in the normal course of events, many models in a class—for example, with different control technologies or smaller or lighter ones—will perform better than the standard because the standard was set to assure that certain other models will be able to comply with it. If averaging is permitted, some of the vehicles that are more difficult to control, but that are capable of meeting the standards, will be relieved of the necessity to reduce emissions to the level of the standard because other models produced by the same manufacturer—without any modification or increased controls--happen to perform better than the required level. The net result of averaging, in these cases, is more pollution than if every vehicle family were required to meet the standard.

Because of the potential for allowing increased emissions from vehicles, the bill prohibits the use of averaging with respect to compliance with any emissions standard established by the Agency under section 202 of the Act.

Idle test mode.—The Federal Test Procedure used by EPA to certify models of automobiles as complying with emission standards does not include an element to test emissions from the vehicle when it is in an idle mode. Emission control systems that perform to required levels under conditions other than at idle may not necessarily adequately limit idle emissions. The consequences of higher emissions in the idle mode are particularly of concern in areas with heavy, slow-moving traffic.

The bill requires the Administrator to add an idle test mode to the Federal Test Procedure for use in certifying automobiles in model year 1990 and thereafter, in order to assure that cars are designed to meet standards under all expected operating modes.

Acceptable quality level.—Currently EPA conducts a Selective Enforcement Audit (SEA) to determine whether selected automobile models in production meet emission standards. Samples of vehicles are drawn from an assembly line and are tested. If, based on the sample, it is determined that 40 percent or more of the model line will fail to meet an emission standard, the certification for that vehicle line is suspended and the vehicles cannot be sold until the manufacturer can demonstrate that the problem has been corrected and the model line will meet the standards. The 40 percent figure is called the "acceptable quality level" (AQL).

The objective of the motor vehicle provisions of the Clean Air Act is to assure that each new automobile meets emission standards. Because an AQL of 40 percent is not adequate to accomplish the objective, the bill requires that 90 percent of the vehicles in the model line sampled be expected to meet each standard or, in other words, that the AQL be 10 percent.

Recalls.—EPA routinely tests in-use light-duty cars and trucks to determine their compliance with exhaust and evaporative emission standards. Manufacturers of nonconforming vehicles may be required to recall and repair the vehicles.

EPA tests samples of vehicles, by engine family. Qualifying vehicles are tested according to the Federal Test Procedure. This initial surveillance testing may identify potential noncomplying models, at which time additional testing is conducted on a larger sample of vehicles in that model line. EPA has a testing laboratory in Springfield, Virginia, and also conducts testing at its Vehicle Emissions Laboratory in Ann Arbor, Michigan.

EPA in-use testing of 1977 through 1982 model year cars resulted in the recall of over 22 million cars and trucks. About one of every five new cars manufactured during that period has been recalled during its lifetime for repair of an emissions problem.

Expanded in-use testing would improve the performance of cars on the road, but Federal resources for, and therefore the extent of, in-use testing have been reduced considerably over the last few years. The bill requires the Administrator, in determining that a class of vehicles does not conform to a standard, to take into account information collected under State inspection and maintenance (I/M) programs and to respond, within 60 days, to a petition for determination of nonconformity from a State that is operating an I/M program, data from which would be the source of evidence that a particular vehicle model is not conforming to emission standards.

The bill also requires the Administrator to issue regulations to enhance the effectiveness of State I/M programs in identifying patterns of defects in vehicle models. The Administrator is to report annually to Congress, with respect to each manufacturer, on recurring or common defects and on remedial actions taken. All of these provisions should assist EPA in identifying vehicle families that do not meet standards and enhance the effectiveness of the recall program.

The bill also specifies that in-use testing for recall purposes is to be conducted on vehicles that have been maintained and used in a normal fashion by owners and not solely on vehicles that have been maintained in strict acccordance with a manufacturer's instructions. There is debate about the meaning of "proper maintenance" in the current law and the reported bill clarifies this to specifically mean normal or typical maintenance. (A vehicle that has been tampered with or intentionally misfueled cannot, of course, be used for recall determinations.) This change recognizes that while many owners do not perform all of the manufacturer's prescribed maintenance, their vehicles are in operation and are potentially emitting pollutants at high levels. The design of a vehicle for durability should be based on the anticipated use and maintenance it will actually receive.

In order to provide adequate in-use testing of vehicles at high altitudes, the bill requires EPA to establish a testing center, in addition to the two in existence, to test vehicles under high altitude conditions. The importance of testing at high altitude is evident from data collected by the State of Colorado showing that 1983 and later model cars at high altitude emit, on average, between 10 and 20 grams per mile of CO, rather than the 3.4 gpm required by the standard. Data collected under low altitude conditions does not necessarily identify models that are not performing properly at high altitudes.

During 1982, 1983 and 1984, in-use testing under high altitude conditions was conducted by the Colorado Department of Health at the Aurora Vehicle Emission Technical Center. The Center received funding in those years from EPA, but since 1984, has not had such funding and has ceased in-use testing. Data generated by the Center prompted some limited voluntary recalls by manufacturers but was not sufficient to support determinations of nonconformity under the Act.

The bill requires that the testing conducted under high altitude conditions be of a quality to permit determinations of nonconformity with standards and to provide adequate bases for requiring manufacturers to recall and repair nonconforming vehicles.

Anti-Tampering.—Current law prohibits manufacturers, dealers, service station or garage operators, fleet owners or those leasing vehicles, from removing or disabling components of vehicle emission control systems. Individual owners or operators of vehicles are not prohibited from performing the same activities.

In its 1986 Motor Vehicle Tampering Survey, EPA concluded that one out of every five passenger cars and light-duty trucks showed evidence of tampering with at least one component. Twenty percent of the over 7,500 vehicles inspected fell into the "tampered category," the same percentage as in 1985.

Tampering or misfueling can cause dramatic increases in emissions of hydrocarbons, carbon monoxide and nitrogen oxides. For example, removing a catalytic converter can increase hydrocarbon emissions by about 500 percent and carbon monoxide emissions by about 400 percent. The 1986 survey found that air-pump systems were the most frequently tampered with components (8 percent). By tampering with the air-pump system, the motorist can increase hydrocarbon emissions by 200 percent and carbon monoxide by 800 percent.

The provision of the reported bill makes clear an individual's liability for knowingly disabling emission control components. Individuals discovered through vehicle inspection and maintenance programs or other means to have knowingly impaired a vehicle emission control system would be subject to civil penalties of up to $2,500.

The bill does not preclude temporarily disabling emission control components while repairs or other adjustments are being made. Nor does the bill require sweeping new enforcement initiatives to be undertaken by EPA or the States to identify possible instances of tampering by individuals.

As another means of discouraging the knowing disabling of emissions controls, the bill also makes illegal the manufacture or sale of so-called "defeat devices" that render inoperative elements of a vehicle emission control system. The requirement that such use be within the specific knowledge of the manufacturer is not intended to establish a standard of proof more appropriate to criminal actions, since this is a civil enforcement action.

This section of the bill provides that civil penalties may be assessed by the Administrator, not only against individual owners for tampering, and manufacturers and sellers of defeat devices, but for all other acts prohibited under section 203(a) of the Act. Current law provides that penalties can be sought only through judicial proceedings brought in an appropriate United States District Court.

The new provision gives the Administrator the authority to assess such a penalty by an order made on the record after an opportunity for a hearing. The Administrator is to determine the amount of the penalty taking several specified factors into account. The list of factors to be considered is not intended as an exclusive enumeration but as a guide to the Administrator.

A person against whom a penalty is assessed may seek judicial review of the administrative order in an appropriate United States Court of Appeals. If a properly assessed penalty is not paid, collection will be sought by the Attorney General in an appropriate district court of the United States where the validity, amount and appropriations of such penalty will not be subject to review.

The addition of administratively assessed civil penalties made by this section of the bill will give the Administrator a less costly and more expeditious enforcement tool that nonetheless assures due process for alleged violators.

Warranties.—Section 207(a) of the Act requires vehicle manufacturers to warrant that a vehicle is free from defects that will cause it to fail to meet emission standards at any time during the useful life of the vehicle. A second warranty provision in section 207(b) requires a manufacturer to pay for correcting conditions that caused a vehicle to fail an I/M test administered during the vehicle's useful life.

As discussed earlier, the bill changes the definition of "useful life" in current law and in doing so, extends the period during which vehicles are under the manufacturer's warranty. The purpose of the extension of warranty coverage is twofold: first, to serve as an incentive to manufacturers to build vehicles that will meet emission standards for the expected actual life of the vehicle, and, second, to increase the likelihood that vehicles that fail I/M tests will be repaired as as to bring emissions in line with the standards.

Most States with I/M programs have set limits on the repair costs that vehicle owners must incur to bring vehicles into compliance with standards. These limits are a reflection of the judgment that is it inequitable to require owners to pay for expensive repairs that are the result of failures by manufacturers to produce vehicles that will meet emission standards throughout the period of vehicle use. The result of this judgment is that heavily polluting vehicles continue to operate in areas that already exceed health standards for ozone and carbon monoxide. Requiring manufacturers to pay for correcting problems in emission control systems increases the likelihood that polluting vehicles will be repaired. It is also appropriate protection for the vehicle owner.

Extending the period for coverage of the manufacturer's warranty elicited criticism from the automotive service and parts industries, who argue that such a provision gives a new monopoly to automobile dealers who perform the warranty work. These critics say that dealerships will perform not only warranty work but all incidental maintenance work, as well, greatly reducing business for non-dealer auto repair shops and suppliers.

Studies conducted in California and Oregon suggest that the fears of the aftermarket industry are unfounded. A review conducted by California in 1986 and 1987 reported,

> The data continue to show, as they have since 1979, that about 80 percent of vehicles still under warranty receive smog check related repairs at independent (non-dealership) repair facilities . . . (T)here does not appear to be a trend towards dealerships increasing their market share, as might be expected when the public becomes more aware of warranty and the price of repairing certain emission control parts increases.

In the Oregon study, only 6 percent of Portland drivers and 10 percent of Medford car owners were found to take their vehicles to a dealer after failing to pass an I/M test, and in Medford, only 27 percent of owners of cars still covered by the warrantly returned vehicles to dealers for service.

Several provisions of the bill do specifically address the concerns of the aftermarket industry by strengthening existing provisions of the Act. The representatives of the aftermarket industry have testified that the list of parts that EPA has identified as "designed for the primary purpose of reducing vehicle emissions" is too extensive, forcing car owners to return to dealers for service that is not directly related to emissions control. In response to this criticism, the bill specifically enumerates the parts and equipment that are subject to the warranty provisions so that car owners will know that they may have routine work done at the place of their choice, without foregoing warranty coverage.

The bill also strengthens the existing prohibition against manufacturers' requiring use of certain parts or service establishments in order to keep the warranty in force. Current law permits certain exceptions to the prohibition if the Administrator determines that specific parts or services are needed in order for the vehicle to function properly. The bill deletes these exceptions, making it more likely that maintenance will be performed by service establishments other than dealerships and that replacement parts will come from a wider range of suppliers.

The automotive service and supply industry also testified that longer warranties will increase the cost of new vehicles and, perhaps, provide automakers an opportunity to increase costs disproportionately to the actual cost of the warranty. The bill requires that warranty price information be displayed on new vehicles and be independently verified by the Administrator in order to provide clear and accurate information about warranty costs to the consumer. The bill also requires that the manufacturer affix a decal explaining the optional nature of any warranty coverage beyond that required by the Act in order to assure that the dealer does not use warranty provisions of the Act to mislead consumers about the availability of, or need for, additional coverage.

Finally, the bill restates section 207(g) of the Act with regard to the vehicle owner's right to choose parts and service for emission-related components from any establishment for the purpose of performing proper maintenance needed to keep the warranty in force. This clarifies that the purchaser is not obligated to have all service work performed at the dealer to meet the proper maintenance requirement.

The reported bill provides time for both the manufacturer and the aftermarket industry to adjust to the excluded useful life, since it is not effective until the 1990 model year.

Desulfurization of Diesel Fuel

SUMMARY

New section 211(h) requires that diesel fuel have a sulfur content not greater than 0.05 per centum by weight after July 1, 1990. Also, the certification fuel used in diesel vehicles and engines manufactured during and after model year 1991 is required to have a sulfur content not greater than 0.05 per centum by weight. Small refineries are not required to meet this standard until July 1, 1993. The Administrator is required to report to Congress within 6 months of enactment on whether a sulfur content level in diesel fuel of 0.05 per centum by weight is necessary to assure compliance by heavy duty-diesel vehicles and engines with particulate emission standards specified in section 202(a)(3)(F) of in regulations under section 202 for model years 1991 and 1994 or to protect public health.

DISCUSSION

Although the Agency was required to prescribe regulations applicable to emissions of particulate matter from classes and categories of vehicles manufactured during and after model year 1981 under provisions of the 1977 Clean Air Act amendments, EPA failed to establish regulations for heavy-duty trucks and buses. The Agency finally rectified this problem by promulgating regulations, under court order, in March, 1985, to be effective in the 1991 and 1994 model years. Thus, the mandated regulations will become fully effective some 10 to 13 years after the Congress required the Agency to act.

In testimony a number of witnesses noted that diesel particulates cause cancer, genetic mutations and other health realted ailments. Particulate emissions from diesel-equipped vehicles are formed as a result of incomplete combustion of the fuel. The particulates in diesel exhaust differ both in quantity and composition from particulates in gasoline engine exhaust. Diesel-equipped engines can emit thirty to one hundred times more mass, on a gram per mile basis, than gasoline powered, catalyst equipped vehicles. Over 90 percent of diesel particulates are less than one micron in size and are therefore small enough to be inhaled and deposited deep within the lungs. EPA has reported that up to 10,000 chemicals may be adsorbed on the surface of diesel particulates and drawn deep into the lungs. Many of these chemical compounds are mutagenic in short-term bioassays, and have been found to cause cancer in laboratory animals.

The testimony documented that desulfurization of diesel fuel is the most cost effective short-term means of removing particulates from vehicle exhaust. It is estimated that the use of diesel particulate emission traps on vehicles would cost from $10 to $50 per pound of sulfur removed, while limiting the sulfur content in diesel fuel to a level of 0.05 percent as required in this section, would cost 54 cents per pound of sulfur removed. The nationwide average sulfur content in motor vehicle diesel fuel was 0.27 percent in 1986. Sulfur reduction to a 0.05 percent level is technically feasible. Local rules currently in effect for southern California limit the sulfur content of diesel fuel sold in the Los Angeles areas to 0.05 percent by weight. California oficials have stated that the increased cost of diesel fuel in their area due to desulfurization is three cents per gallon, much less than they had anticipated. In addition, an EPA contractor report has stated that reducing the sulfur content of diesel fuel would significantly reduce corrosive wear and deposit formation, potentially extending engine life and reducing maintenance costs. The report concluded that these savings would be potentially several times the cost of reducing sulfur at refineries.

This new section prohibits the sale, after July 1, 1990, of diesel fuel for use in motor vehicles which has a sulfur content in excess of 0.05 per centum by weight. In addition to the benefits to be gained through reduction in particulate exhaust emissions the Office of Technology Assessment has estimated, based on low growth assumptions, that by 1995 a standard of 0.05 percent maximum sulfur content would decrease emissions of sulfur nationwide by 285,000 tons annually below the level expected if the current sulfur content of diesel fuel were maintained. Sulfur emissions are precursors of acid deposition.

Desulfurization for diesel fuel is more effective in reducing particulate emissions in the short-term than any of the exhaust after-treatment device options for two reasons. First, upon full implementation of this limitation on fuel fulfur content, the entire diesel vehicle fleet would be subject to control. Use of exhaust after-treatment devices would only affect new diesel vehicles. Second, this provision will enhance the ability of the heavy-duty enginer manufacturers to meet the diesel particulate standards promulgated for the 1991 urban bus models and the 1994 heavy-duty truck standard. Without a sulfur content limit of 0.05 percent, heavy-duty enginer manufacturers testified that they cannot meet the 1991 and 1994 standards because the exhaust control technology currently available is overwhelmed in operation by the sulfur content of the emission.

Included in this section is a provision which will allow more time for small refineries to comply with the requirement. A "small refinery" is defined as a facility with a capacity of 175,000 barrels per day or less owned by an entity with total refining capacity less than 350,000 barrels per day. Small refineries will have until July 1, 1993, to meet the standard. Capacity is to be measured in crude oil throughput on a calendar day basis as of January 1, 1987. Approximately one-third of the refining capacity in the United States would be classified as "small" under these provisions.

This section also requires the Administrator to report to Congress within six months of enactment as to whether the 0.05 per centum by weight sulfur content requirement is necessary to assure compliance with the particulate emission standards specified in section 202(a)(3)(F) or in regulations under section 202, or to protect public health. If another sulfur standard were necessary or sufficient to attain the same degree of health protection from particulates, the Congress could consider a modification of this provision.

Gasoline Volatility

SUMMARY

New section 211(i) directs the Administrator to promulgate, within 2 years of enactment, regulations requiring that the volatility, measured as Reid Vapor Pressure (RVP), of gasoline sold during warm weather months (the period of peak ozone problems) not exceed nine pounds per square inch. Ozone Regional Transport Commissions established under section 178 may request a lower RVP level for such regions. No manufacturer or importer of gasoline may sell or introduce any fuel that does not comply with the nine pound RVP limit after April 1, 1990.

DISCUSSION

Evaporative hydrocarbon emissions from gasoline-fueled vehicles occur when gasoline vapors expand in the fuel tank and when residual engine heat causes evaporation of fuel remaining in the carburetor and the fuel lines. These emissions are dependent on fuel volatility, measured in part as the Reid Vapor Pressure (RVP). Evaporative emissions are a major source of hydrocarbons and increased gasoline volatility causes excess hydrocarbon emissions. EPA estimates that evaporative emissions from fuel volatility account for eight percent of the total hydrocarbon inventory nationwide.

A comprehensive analysis issued by the EPA in November, 1985, concluded that the volatility of fuels in-use is significantly higher than the volatility of fuels used during vehicle certification under the Agency's title II regulations. These existing standards which control evaporative hydrocarbon emissions allow vehicle control systems to be tested with certification gasoline having a volatility ranging from 8.7 psi to 9.2 psi RVP. The average volatility for commercial fuel is now 11.5 psi, with summertime volatility increasing to over 13 psi.

A significant portion of the increase in commercial gasoline volatility has been caused by increased use of butane and other low cost highly volatile additives in gasoline. EPA volatility data collected over several years suggest the trend toward increased volatility in gasoline will continue. There are no RVP limits currently in place to impede or reverse this trend.

In its 1985 assessment, EPA suggested a summertime RVP reduction to a level equal or nearer to that of certification gasoline, among other alternatives. EPA estimated an annual emission reduction of 61,000 tons, at an estimated cost of $5 million annually, under a summertime reduction program. The August 1987 Notice of Proposed Rulemaking on volatility has more up to date analysis on reductions and cost. For example, the cost of EPA's proposal to the refining industry is estimated to be $450 million per year. The consumer energy benefits (recovered fuel) are $290 million per year, so the net cost is $160 million per year or about ½ cent per gallon.

Imposition of a nine pound psi Reid Vapor Standard will significantly reduce the level of evaporative hydrocarbon emissions in nonattainment areas and nationwide.

This section also allows Ozone Regional Transport Commissions to request a lower RVP for specific regions. This provision will allow further reductions in evaporative hydrocarbon emissions in ozone regional transport regions with elevated ozone levels.

The provision prohibits the manufacture or importation of any fuel which does not comply with summertime RVP limits after April 1, 1990.

A one pound volatility waiver is included for ethanol/gasoline blends containing 10 percent denatured anhydrous ethanol. This provision was included in recognition that gasoline and ethanol are mixed after the refining process has been completed. It was recognized that to require ethanol to meet a nine pound RVP would require the creation of a production and distribution network for subnine pound RVP gasoline. The cost of producing and distributing this type of fuel would be prohibitive to the petroleum industry and would likely result in the termination of the availability of ethanol in the marketplace. Under this provision, the Reid vapor pressure limitations promulgated pursuant to this subsection for such ethanol/gasoline blends shall be one pound per square inch greater than the applicable Reid vapor pressure which apply to gasoline.

Reid vapor pressure of ethanol/gasoline blends is currently uncontrolled. Adding ethanol to gasoline increases the RVP of the blended fuel by approximately three to 10 percent. Generally, ethanol blends burn cleaner than pure hydrocarbon gasoline and thus cause fewer tailpipe emissions. The increase in RVP tends to cause increased evaporative emissions of volatile organic compounds (VOC's) from vehicles using ethanol blended fuel.

This provision would impose RVP controls on ethanol blends for the first time and would forego regulation of a very small percentage of the total nationwide volatile organic compounds emissions inventory. This provision will allow ethanol blending to continue to be a viable alternative fuel, with its beneficial environmental, economic, agricultural, energy security and foreign policy implications. Finally, this provision will remove the possibility that ethanol blends would be used to circumvent the proposed volatility restrictions.

Although the Committee is concerned with respect to fraudulent practices in the gasoline marketing industry (as reported by the EPA Inspector General on the abuse of lead banking rights under the lead phasedown and GAO reports on at-the-pump overcharges for low quality fuels) and encourages EPA to vigorously enforce the RVP limits on gasoline and blended fuels which are imposed by this subsection, the enforcement strategy recently proposed by the Agency in the context of its own regulatory program to control fuel volatility would be totally unworkable for those motor fuels which are a blend of gasoline and ethanol and which are allowed a higher RVP limit under the reported bill.

Unlike base gasoline fuels which are produced and tranported in large batches (measured in the millions of gallons), ethanol is generally blended with gasoline at the terminal in relatively small batches (thousands of gallons) just before delivery to the retail outlet. Requiring an actual test of the volatility of this blend in every case, as EPA has proposed, would not be feasible considering the very large number of batches mixed over any period, the lack of testing facilities and the time to acquire testing results.

The reported bill contains an alternative enforcement arrangement requiring that blenders (and others in the distribution and marketing chain) be able to demonstrate compliance with the RVP limit by providing a certification that the base gasoline is in compliance with the 9.0 lbs. psi limitation and a certification that the blended fuel meets the waiver conditions of the Clean Air Act (that is, the ethanol portion does not exceed 10 percent by volume of the final fuel). These waiver conditions must also be satisfied to qualify the final fuel for the highway excise tax exemption and are thoroughly enforced by the Internal Revenue Service.

EPA is to assure that all base gasolines will be tested at some point in the production or distribution chain (before blending) to provide the evidence on which a certification is made. EPA may also conduct auditing programs to measure compliance which require the blender or marketer to perform spot testing of the final fuel so that violations may be traced up the distribution chain. However, certification of the volatility of the base fuel and compliance with the ethanol waiver will be a satisfactory showing for a marketer or blender or others to avoid liability for penalties, absent other evidence to the contrary.

Nothing in this language would authorize the blending of ethanol with a base fuel having an RVP greater than 9.0 lbs psi, even if the resulting fuel product would be within the 1 lb psi allowance.

Oxygenated Fuels

SUMMARY

New section 211(j) requires the sale or introduction of gasoline used in motor vehicles in any nonattainment area as defined by section 171(2) for carbon monoxide to have an oxygen content of at least 2 percent by weight during the period October 1 to April 1 of each year after October 1, 1989. After October 1, 1990, the oxygen content of such fuel shall be no less than 3.7 percent by weight.

The Administrator may waive the requirements concerning the level of oxygen content of fuels in a specific area if implementation of this provision would result in an unacceptable increase in other air pollutants.

Within 2 years of enactment, the Administrator is required to report to Congress concerning the increased use of oxygenated fuels nationwide and the use of oxygenated fuels with an oxygen content by weight of 3.7 percent. The report should consider emission analysis, as well as, the driveability, fuel volatility, and availability with increased oxygen levels.

DISCUSSION

There are roughly 65 areas that are currently not meeting the National Ambient Air Quality Standard for carbon monoxide. Carbon Monoxide is emitted directly as a pollutant and generally the result of imperfect combustion in vehicle engines.

Oxygenated fuels offer a means for significant near-term reduction in carbon monoxide levels, particularly at higher elevations. The Congressional Research Service estimates oxygenated fuels would reduce carbon monoxide emissions from pre-1981 vehicles by twenty percent or more. Reductions from later models would be lower due to their use of three way catalysts and oxygen sensors in the emission control systems. Emission reductions at higher elevations can be expected to be greater.

The provision mandates the use of oxygenated fuels from October to April because most carbon monoxide exceedances occur during the winter months due to colder ambient temperatures, atmospheric temperature inversions and, in some areas, the combined effects of high altitude and climatic conditions.

Increasing the oxygen content of gasoline may assist some nonattainment areas reach attainment. In addition, many areas now in attainment may find it possible to maintain attainment through greater use of oxygenated fuels.

Testimony before the Subcommittee on Environment Protection documented the impact of oxygenated fuels on reduced carbon monoxide emissions. The dominant component affecting emission levels of these fuels is the oxygen content. Oxygenated fuels, containing oxygen via an alcohol or ether blended with gasoline, have been shown to be effective in lowering carbon monoxide emissions from motor vehicles. Emission reductions are directly attributable to the oxygen contained in these fuels by leaning the air/fuel ratios of the fuel. Witnesses before the Subcommittee favored an oxygen content between 2 percent and 3.7 percent by weight. Oxygen content less than 2 percent does not have a significant impact upon carbon monoxide emissions. Additional time was allocated for oxygen levels to reach 3.7 percent in order to permit the full-range of oxygenated fuel blends to become available. Increasing the level of oxygen beyond 3.7 percent may affect fuel characteristics and impact storage stability and volatility. These issues are expected to be addressed in the study required by the amendment.

Currently several basic fuel blends are in use as oxygenated fuels. These include gasoline/ethanol, gasoline/methanol and gasoline/methyl tertiary butyl ether (MTBE).

The Committee believes greater use of oxygenated fuels will reduce carbon monoxide levels in many nonattainment areas. Oxygenated fuel programs are being adopted in a number of areas. The Committee is uncertain of the over-all emissions impact of increased oxygenated fuel use and therefore is concerned about any unintended adverse increase in the level of other air pollutants. For these reasons, the Committee has required the Agency to assess, in a comprehensive fashion, the effects of increased oxygenated fuel use.

FUEL ADDITIVES AND LUBRICANTS

The working paper reported by the Subcommittee on Environmental Protection included a requirement that "thorough and complete health and environmental effects testing" be conducted on all fuel additives and lubricants used in motor vehicles. Testing was required within a 5-year period for each additive or lubricant. This provision was deleted during Committee markup with the understanding that the Administrator would be encouraged to use the authorities of existing law, including sections 211 (b) and (c) of the Clean Air Act, to conduct a thorough review of fuel additives in the near-term.

Fuel additives can present a significant threat to public health and the environment. For instance, lead is a fuel additive used to increase octane and provide lubrication for engine valves. Its negative impact on neurological development and cognitive ability in children is well-documented. In addition, lead may poison the catalytic converters which remove other pollutants from motor vehicle exhaust. As a result, the Environmental Protection Agency has promulgated regulations to phase-out the use of lead additives in gasoline fuels. Other additives which may pose significant threats to public health include ethylene dibromide and ethylene dichloride (used as lead scavengers) and benzene (which is now added to increase octane as an alternative to lead). Recently, EPA also proposed a voluntary testing program (to be conducted by the manufacturers) on the health effects of methyl tri-butyl ether or MTBE, another octane enhancer, the use of which is increasing rapidly as lead is phased out.

There is less evidence on the emissions, exposure and potential adverse health effects which may be associated with lubricant formulations. Lubricant emissions, in any event, are only a small portion of the pollutants in the exhaust from a motor vehicle and are generally not significant in comparison to the emissions attributable to the fuel and fuel additives.

In its 1985 air toxics strategy, the Agency recognized that fuel additives may be causing a significant threat to public health and as part of that strategy EPA indicated that it would be proposing a series of protocols for the testing of fuel additives.

Section 211(b) of the Clean Air Act gives the Administrator authority to require the manufacturer of any fuel additive to "conduct tests to determine potential public health effects of such fuel or additive". Section 211(e) requires the Administrator to implement this requirement through regulations applying to new fuel additives already in commerce (in 1977 when the language was enacted), not later than 3 years after enactment (or by 1980). Such regulations have not been established by the Agency. Section 211(c) gives the Administrator authority to "prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive . . . if . . . any emission product of the fuel or fuel additive causes, or contributes, to air pollution . . ."

The Agency should implement the authorities of the 1977 Act with respect to fuel additives by developing criteria (based on factors such as emissions of the additive or combustion byproducts, exposure to the additive, byproducts or atmospheric transformation products and the potency of the additive, byproduct or transformation products as human or environmental toxicants) for testing determinations. Each additive should then be judged according to the criteria and testing programs for additives of concern should be commenced using the authorities of section 211(b). As the Agency has not implemented already enacted non-discretionary provisions of law in this respect, this activity is to be completed on an expeditious schedule.

HYDROCARBON EMISSION CONTROLS

SUMMARY

This section of the bill adds a new section 130 to the Clean Air Act requiring the EPA Administrator to establish emission limitations, standards of performance, or standards for product composition or application for hydrocarbon emissions associated with six source categories: (1) commercial solvents; (2) consumer solvents; (3) architectural coatings; (4) pesticide application; (5) traffic marking coatings; and (6) metal parts coatings in military specification applications and aerospace industry applications.

For existing sources or activities not subject to new source performance standards under section 111 or lowest achievable emission rates under section 173 of the Act, the minimum degree of emission reduction or control required for these six source categories must be that which is achievable by the adoption of reasonably available control technology (RACT) as modified in title I of the bill.

In developing regulations under subsection (a)(1) and (a)(6) of this section, the Administrator shall consult with the affected industry, including the industries procuring such parts, and with representatives of the Department of Defense, the Federal Aviation Administration, and the National Aeronautics and Space Administration involved in the establishment of specifications for such parts or coatings.

Any requirement established by the Administrator for existing or new sources or activities under this section of the Act to control hydrocarbon emissions from the six source categories must be included as a requirement of an applicable implementation plan.

DISCUSSION

The six significant source categories identified in section 130 are associated with emissions of hydrocarbons, which are a known precursor pollutant to ozone (or smog). Hydrocarbon emissions, identified by this provision require control through implementation plans by emission limitations, performance standards, or standards for product composition or application. All six source categories include products traditionally containing petroleum-based solvents. The limits or standards required by this section are meant to control the volatile organic compounds that are emitted from either the manufacture or use of these products.

EPA is required to exercise its existing authority to establish new source performance standards, best available control technology, reasonably available control technology and lowest achievable emission rates for new and existing sources and to establish product composition of application standards. EPA is to exercise this authority as the terms are modified by the Committee bill. The bill modifies the definitions of major source, lowest achievable emissions rate, and reasonably available control technology.

The new authority to establish product composition or application standards provided for in this section allows a more direct means of regulating the volatile organic compounds in the applicable products, and is intended to encourage the proliferation of less polluting, viable products.

In developing regulations for commercial solvents and metal parts coatings in military specification and aerospace industry applications, the Administrator must consult with the affected industries, and with representatives of the Department of Defense, Federal Aviation Administration, and National Aeronautics and Space Administration that are involved in the establishment of specifications for such parts or coatings.

Specific consulations are required because of the unique nature of many of the applications included in these source categories, e.g., satellite coatings or coatings used to contain highly corrosive compounds, to assure specifications that are compatible with essential applications, quality products, consistent government specifications, and improve air quality. Although consultations are not specifically required for the other four source categories, the Administrator should as a matter of course consult with affected industries and agencies affected by such standards.

In developing emission limitations or product composition or application standards for products such as colorless waterproofing sealers, which may fall under the source categories for architectural or traffic marking coatings, EPA should control hydrocarbon emissions while protecting against ineffective products of little value, i.e., ineffective or unduly toxic waterproofers. EPA should consider existing quantitative standards for product effectiveness, such as existing Federal performance specifications or industry standards, as well as weighing the product necessity or the availability of appropriate substitutes to garner needed emission reductions.

FEDERAL ENFORCEMENT

SUMMARY

The reported bill amends section 113(c) of the Clean Air Act to provide more severe penalties for criminal violations. Fines are not less than $5,000 nor more than $50,000 per day of violation. Prison terms may be up to 3 years for each violation. Second or subsequent violations are subject to a fine of not more than $100,000 per day of violation, or imprisonment for up to six years, or both.

Penalties for giving false information under section 113(c)(2) are increased to a $25,000 fine and 2 years imprisonment.

Section 113 is also amended so that violations of each part of amended section 112 (dealing with hazardous air pollutants) are enforceable.

DISCUSSION

When the Clean Air Act was first enacted in 1970, the criminal penalties were thought sufficient to deter knowing violations of the Act and regulations under it. Since that time, with the regarding of the sentencing structure under Federal criminal law, the penalties established under section 113 have become only misdemeanors. As such, it is unlikely that violations will draw sufficient attention from U.S. Attorneys. This has contributed to a lack of vigorous criminal enforcement of the Clean Air Act.

A similar problem with other environmental statutes has led the Congress to increase the penalties for criminal violations to felony levels. The reported bill completes the general upgrading of environmental crimes to felony status, also reflected in the recently enacted reauthorization of the Superfund statute and the Clean Water Act.

In the current law, enforcement of the hazardous air pollutant provisions of section 112 is focused on violations of section 112(c), the prohibited acts provision. Under the amendments to section 112, there are requirements throughout the section, and section 113 is amended to reflect that change.

STANDARDS FOR EMISSIONS FROM MUNICIPAL WASTE INCINERATION FACILITIES

SUMMARY

A new section 131 is added to the Clean Air Act to direct the Administrator to set performance standards to control the emissions for new and existing municipal solid waste incineration units. The performance standards shall specify emission limits reflecting the greatest degree of emissions limitation achievable through application of best available control technologies and practices, and shall be effective for new units no later than eighteen months after enactment. Within 12 months after enactment, the Administrator shall set performance standards specifying emission limits for existing facilities, and a timetable for bringing existing units into compliance with those standards no later than 6 years after enactment.

Available control technologies and practices include electrostatic precipitators, fabric filtration, flue gas scrubbers, spray dry scrubbers, condensation scrubbers, source separation, source reduction, recycling, negative air flow, and good combustion practices, including use of auxiliary fuel to maintain specific temperatures. In setting performance standards the Administrator may take into account the use of other technologies and practices, such as selective or non-selective catalytic reduction, wet flue gas denitrification, selective non-catalytic reduction, wet scrubbing, or catalytic oxidation.

In establishing performance standards, the Administrator shall specify emission limits for particulate matter, acid gases, sulfur dioxide, oxides of nitrogen, carbon monoxide, heavy metals, lead, cadmium, halogenated organic compounds, dioxins, and dibenzofurans, and shall use numerical limits or other means to reduce the emissions of volatile organic compounds, mercury, beryllium, hydrogen floride, hydrogen chloride, antimony, arsenic, barium, chromium, cobalt, copper, nickel, selenium, zinc, polychlorinated biphenyls, chlorobenzenes, chlorophenols, and polynuclear aromatic hydrocarbons. The legislation establishes maximum emissions limits which the standards may not exceed for particulates, carbon monoxide, hydrogen chloride, and sulfur dioxide. The standards must establish a retention temperature and time of not less than 1,800 degrees Farenheit for 1 second at fully mixed height, or the equivalent.

After the date of enactment, a municipal waste incineration unit cannot be permitted unless an ash management plan has been submitted; construction on such unit shall not begin until enforceable contractual commitments with specific sufficient capacity for ash treatment or disposal is submitted. Each permit issued under this section is to be reviewed every 5 years.

Beginning 18 months after enactment, a municipal waste incineration facility shall not be permitted unless the jurisdiction served has prepared an enforceable solid waste management plan in accordance with section 4003 of the Solid Waste Disposal Act. The plan must have analyzed all solid waste management alternatives in terms of minimizing the threat to human health and the environment, maximizing the conservation of resources through recycling, source separation and waste reduction, and the cost effective manner in which they can be achieved, and must include the operation of the incineration unit in that analysis. If the jurisdiction has prepared a solid waste management plan which does not reflect the operation of a municipal solid waste incineration unit, a permit shall not be issued until the jurisdiction, after providing notice and opportunity for public hearing, revises its plan.

The Administrator shall promulgate, within twelve months after enactment, regulations requiring continuous monitoring for opacity, hydrogen chloride, sulfur dioxide, oxides of nitrogen, carbon monoxide, carbon dioxide, oxygen, stack temperature and furnace temperature, and other emissions the Administrator determines should be monitored continuously. All other emissions for which standards are set shall be monitored periodically. The regulations may require the owner or operator of a municipal incineration facility to undertake, or to pay for the establishment and operation of, a program to detect the impact of the unit, or any releases of the unit, on humans or the environment. The Administrator or the State is authorized to request the Administrator of the Agency for Toxic Substances and Disease Registry to conduct a health assessment or health surveillance in any case where exposure to municipal incinerator emissions or ash may pose a potential risk to human health.

Notwithstanding any other provision of the Act, each permit for a municipal solid waste incineration unit shall be reviewed every five years, and shall be modified as necessary to assure continued compliance with all applicable requirements as of the date of review. The Administrator or a State may review and modify a permit at any time during its term. No permit may be issued by any agency, instrumentality or person that has any responsibility for the design, construction or operation of the permitted municipal incineration unit.

Nothing in this section shall diminish the Administrator's authority to promulgate more stringent standards under section 111 or 112 of the Act, nor diminish authority to regulate pollutants not specified in subsection (a), nor diminish other authorities, including the authority to establish national ambient air quality standards for such pollutants. No requirement of an applicable implementation plan under section 165 or section 172(b)(6) may be used to weaken standards in effect under this section.

Any State may submit a proposed State program for concurrent enforcement to the Administrator. If the Administrator has not determined within 90 days after submission that the State plan does not provide enforcement equivalent to Federal enforcement, the State plan shall be treated as authorized. The Administrator shall withdraw authorization for such State plan whenever the Administrator determines that the State is not enforcing in a manner equivalent to Federal enforcement.

Any State or its political subdivision may adopt and enforce standards, requirements or regulations more stringent than those in effect under this section.

For the purposes of sections 111(e), 113, 114, 116, 120, 304, and 307, the standards and requirements promulgated under this section shall be treated as emission limitations or performance standards under section 111, and each requirement of an authorized State plan shall be treated as a requirement of an applicable implementation plan.

A "municipal waste incineration unit" is defined as a distinct operating unit at any facility at which solid waste from commercial, industrial and public source (including single and multiple residence, hotels and motels) is combusted, but does not include facilities required to be permitted under section 3005 of the Solid Waste Disposal Act. The Administrator may promulgate separate standards for incinerators of hospital wastes.

A municipal waste incineration unit is "new" under this section if it is not operational on or before January 1, 1988, and construction is not substantially completed. Facilities are considered substantially completed if the cost of the required pollution control equipment will be more than twice what it would have cost to include the equipment as part of the permitted design. Effective January 1, 1992, units which have been in operation 20 years or more will be considered "new" units under this section.

A municipal waste incineration unit is considered to be a "modified"unit if modifications have occurred after the date of a standard under subsection (a) where the cumulative cost of the modifications (over the life of the unit) exceed 50 percent of the original cost of construction and installation.

An "existing" municipal waste incineration unit is one which is not a new unit.

An "enforceable solid waste management plan" is a plan adopted by a State or designated local government under section 4006(b) of the Solid Waste Disposal Act, which contains provisions with the force of law or to which the designated governmental unit is contractually committed. To the extent practicable, the plans shall require the elimination or reduction of specific wastes prior to incineration which results in safer disposal methods and reduces the threat to human health and the environment. Such provisions can include product composition prohibitions (such as printing inks and pigments), source separation, and recycling practices.

Not later than one year after enactment, the Administrator shall publish guidelines identifying items or materials which should not be incinerated, but should be removed from the waste stream prior to incineration through source separation or product composition regulations.

The Administrator shall develop a model State program for training and certifying municipal waste incinerator personnel. States may implement the EPA model program, or EPA may authorize a State to implement its own program if it is at least as stringent as EPA's model. All municipal incinerator operators and management personnel must be certified through such a program.

DISCUSSION

On July 1, 1987 EPA provided Congress with a report, required by section 102 of the Hazardous and Solid Waste Amendments of 1984, on the health risks posed by emissions of polychlorinated dibenzo-p-dioxins from municipal solid waste incinerators. EPA's health risk analysis concentrated on the estimated risk of cancer through direct inhalation of incinerator emissions. The analysis did not quantitatively assess health risks other than carcinogenic risks from dioxin, and failed to quantify risks associated with other avenues of exposure to this carcinogenic risk, such as ingestion of food and water polluted as a result of incinerator emissions. Nevertheless, EPA's study estimated that the annual incidence of cancer aggregated over the United States is 3 to 38 cases per year for existing municipal waste incinerators, and 2 to 22 cases per year for those incinerators projected to be built. The maximum individual risk (for individuals with the greatest potential exposure to incinerator emissions) ranges from 1 in 1,000 to 1 in 10,000 for existing facilities, and from 1 in 10,000 to 1 in 100,000 for projected facilities. Many in the environmental community believe these risks are underestimated. The report concludes that there is cause for concern over health risks from exposure to dioxin and furan emissions of municipal waste incinerators.

In addition to the dioxins and other compounds (cadmium, beryllium, and arsenic) quantified in the cancer risk assessment, EPA's report analyzed emissions of other pollutants of interest, including lead, mercury, chromium, nickel, and other metals; sulfur dioxide, hydrogen chloride and other acid gases; carbon monoxide; nitrogen oxides; and classes of unspecified organics. It was found that application of a control technology for one pollutant may affect control of other pollutants, and surrogate relationships among pollutants were discovered. For example, since complete combustion affects emissions of dioxins and other organics and also affects the production of carbon dioxide rather than carbon monoxide, a low carbon monoxide emission rate can be used as a surrogate measure of complete combustion and as an indicator of dioxin emissions.

The reported bill requires EPA to promulgate standards of performance for air emissions from municipal incinerators based on the best available technology and practices. The principal concern with incinerator emissions is the control of organics (particularly dioxins) and heavy metals to minimize their adverse health affects. Regulations should seek to minimize exposure of potential receptors. This is not a LAER concept, seeking the best of the best controls of criteria pollutants and appropriate in nonattainment areas. Standards of performance under section 131 are intended to be based on the best technology and practices for reducing pollutants of concern. Such standards should be protective wherever an incinerator may be located. Siting requirements can add an additional degree of protection for human health or the environment.

The reported bill requires the Administrator to set performance standards which specify emissions limits for a list of pollutants. This provision also specifies maximum emissions limits for particulates, carbon monoxide, sulfur dioxide, and hydrogen chloride. These pollutants are important in their own right or as surrogates for other pollutants. particulates like ash and dust cause soot and visibility problems as well as health problems, but can also carry metals and organic compounds which are not completely combusted. Electrostatic precipitators (ESP) and baghouses which control particulate emissions also control emissions of metals, such as lead, and organics, such as dioxins. (Emissions of hydrogen chloride, which can do considerable damage to structures and other materials, are extremely variable depending on the amount of plastics and paper with bleaching agents in the waste stream.) The scrubbers which control acid gases also control emissions of dioxins and other organics. Carbon monoxide, although a criteria pollutant, results from incomplete combustion, and as such, is a surrogate for dioxin emissions. Practices which maximize combustion efficiency help control the emissions of both carbon monoxide and organics. The legislation requires furnace temperatures of 1800 degrees Farenheit for at least one second at fully mixed height (or its equivalent) as one means of maximizing combustion and controlling organics and carbon monoxide emissions.

While the exact nature of good combustion practices, technologies and devices may vary among the types of municipal waste incinerators (massburn, refuse derived fuel or RDF, and modular units), municipal incineration units of all types are required to meet the statutory emission standards for particulates, carbon monoxide, sulfur dioxide, hydrogen chloride, and furnace temperature set forth in the legislation. Some facilities may require the use of auxiliary fuels at times, such as start-up and shutdown or when wet wastes are being combusted, in order to maintain the required furnace temperature to assure complete combustion.

In addition to the control technologies specified as available, the Administrator is authorized to consider other technologies, such as selective catalytic reduction, for the purpose of establishing performance standards.

Pollutants which are trapped by control devices before entering the air become incinerator fly ash. Managing incinerator ash, therefore, is inextricably linked to controlling air emissions from municipal waste incinerators. Upon enactment of this legislation, new municipal incineration units cannot be permitted unless a plan is submitted detailing how the incinerator ash will be managed and disposed of. No construction can begin on a new incineration until there are enforceable contractual commitments covering specific capacity for treatment and disposal sufficient to handle the amount of ash to by generated by the facility.

Eighteen months after enactment, a municipal waste incinerator shall not be permitted unless the State (or other jurisdiction designated pursuant to section 4006 of the Solid Waste Disposal Act) served by the incinerator has prepared an enforceable solid waste management plan as required under section 4003 of the Solid Waste Disposal Act. If the jurisdiction has prepared a plan, but the plan does not reflect the operation of the incinerator, it shall revise its plan after opportunity for public hearing. The solid waste management plan shall consider all solid waste management alternatives and reflect those which to the maximum extent practicable protect human health and the environment and conserve resources. Consideration should include programs and methods for source separation, recycling, (such as waste separation at curb-side or at transfer centers, bottle bills and other buy-back programs), reuse, composting, and restrictions which might be placed on waste composition, including printing inks and pigments. Such alternatives are to be considered for their protectiveness of human health and the environment and the extent to which they can control emission of organics and other pollutants by removing toxics from the waste stream before incineration, as well as for economic value. The solid waste management plans must reflect the operation of the municipal solid waste incineration unit for which a permit is sought.

Language throughout section 4003 of the Solid Waste Disposal Act refers to comparisons between conservation of materials and recovery of energy. This balance of factors should be kept in mind as incinerators are permitted so that any long-term commitments of waste to be supplied to the incinerator to guarantee adequate Btu input reflect and do not impeded long-term programs for the recovery of materials through recycling and other conservation efforts. To the extent possible, the solid waste management plans, and any Btu commitments made to incinerator owners or operators, should also reflect the guidelines which the Administrator is required to promulgate within twelve months of enactment identifying items or materials which should not be incinerated.

The requirement for an enforceable solid waste management plan will help support the aims of subtitle D of the Solid Waste Disposal Act. Many of such plans need to be updated or approved. Section 131(b)(1) is not intended to result in any hiatus or moratorium in the permitting or construction of municipal incinerators. The requirement does not apply to incinerators that have already received permits. It is not effective until 18 months after enactment, allowing jurisdictions intending to build incinerators to review the plans and determine the adequacy of those plans. This phase-in period should be sufficient for jurisdictions to examine the role of incineration in their overall scheme for solid waste management. No jurisdiction is likely to immediately reach its ideal mix, but a target many communities are considering as a long-term strategy is one-third incineration, one-third landfill, and one-third recycling. Source reduction and the removal of specific materials from the waste-stream are also necessary elements of a comprehensive strategy.

The Administrator is directed to promulgate within twelve months after enactment regulations requiring monitoring and reporting of emissions from new, modified and existing incinerators. Monitoring shall be required at the point where emissions enter the ambient air and at other points as necessary to protect human health and the environment. Continuous monitoring is required for opacity, hydrogen chloride (if an appropriate monitoring device or method is available), sulfur dioxide, oxides of nitrogen, carbon monoxide, carbon dioxide, oxygen, stack temperature, furnace temperature (or secondary combustion zone temperature as appropriate) and any other emissions the Administrator deems necessary. All emissions subject to standards which are not continuously monitored shall be monitored at least every six months, or six months after commencement of operations and every 18 months thereafter if the incineration unit demonstrates compliance with all emissions standards at each previous monitoring and during intervals between monitoring. If the facility is everfound not in continuous compliance with all emissions standards, it must be monitored not less frequently than every six months.

The Administrator or a State is authorized to request the Administrator of the Agency for Toxic Substances and Disease Registry to conduct a health assessment or health study or surveillance, as authorized under section 104(i) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, in any case where exposure to municipal incinerator emissions or ash may pose a potential risk to human health. Such studies may include detection of changes in blood or tissue levels of lead, mercury, cadmium, halogenated hydrocarbons, dioxins or other pollutants. The incinerator owner or operator may be required to establish and operate, or to pay to establish and operate, programs to detect impacts of the incineration unit or any of its releases on humans or the environment.

A recent study of existing municipal waste incinerators prepared for the EPA highlights the importance of trained operator personnel in achieving the good combustion practices necessary to meet safe emissions standards. Under the reported bill, no later than 18 months after enactment, the Administrator shall develop and promote a model State program for training and certifying municipal waste incinerator personnel. In developing the model program, the Administrator should recognize that incinerator facilities vary in size and sophistication of technologies. The Administrator may authorize a State to implement its own program if it has adopted a training program which is at least as stringent as EPA's model program. The program shall include the requirement that all operators and management personnel receive a passing grade on an examination, and participate in continued education on current pollution control technology for municipal incinerators. Every State which permits municipal incineration units should require incinerator operators and management personnel to be certified through an approved state program. As soon thereafter as possible, no municipal solid waste incineration unit should operate without personnel trained in and certified by such a program.

The definition of "municipal waste incineration unit" includes distinct operating units at which commercial, industrial and residential waste, including single and multiple residences, hotels and motels, are combusted. It does not include facilities required to be permitted under section 3005 of the Solid Waste Disposal Act. The Administrator may regulate incinerators which handle hospital and medical wastes under this section, or may set standards for hospital incineration units at least as stringent as the emission standards promulgated under this section.

An incineration unit is considered "new" if it is not operational on or before January 1, 1988, and its construction is not substantially completed. Facilities are considered substantially completed if the cost of required pollution control equipment will be two or more times the cost that would have been incurred if the equipment had been included as part of the permitted design. The price of the control equipment, costs of reconstruction or adding to the structure to permit addition of the control equipment, costs of engineering, and costs of additional land to provide for such reconstruction are among the factors which can be considered in determining whether the cost is twice what the cost would have been if included in the permitted design.

The authority of the Administrator to promulgate more stringent standards under section 112 or any other provision of this Act is not in any way diminished by this legislation, nor shall requirements of sections 165 or section 172(b)(6) be used to weaken the standards under this section.

Any State may submit to the Administrator a program for concurrent enforcement, and ninety days following submission of proposed program shall be authorized to enforce the requirements of this section unless the Administrator determines the State plan does not provide adequate enforcement. The Administrator shall withdraw authorization of State enforcement whenever he determines the State enforcement is not equivalent to Federal enforcement. A State, or any political subdivision, may require more stringent standards, regulations or requirements than that in effect under this section.

MUNICIPAL WASTE INCINERATOR ASH

SUMMARY

A new section 4011 is added to subtitle D of the Solid Waste Disposal Act requiring the Administrator to promulgate regulations for the management, handling, treatment, transportation, reuse, recycling, and disposal of ash from municipal waste incineration units which meet the requirements of section 3001(i) (1) and (2). Such as is declared subject to this new section and subtitle D, and not subject to subtitle C.

Regulations promulgated for the land disposal or ash shall require the installation of two or more liners, both of which are constructed to prevent the migration of any constituent into such liner during operation and post-closure periods, a leachate collection system above and between such liners, and a groundwater monitoring system. In the alternative, ash may be disposed in a monofill with a single liner and groundwater monitoring system located, designed and operated to assure there will be no migration of any constituent into the liner during operation and post-closure periods.

Bottom or combined ash (but not fly ash) which has been treated, as defined in section 1004(34) of the Solid Waste Disposal Act, in accordance with requirements promulgated under this section, may be placed in a sanitary landfill for disposal, if the landfill meets the revised criteria promulgated under section 4010(c).

The Administrator is directed to promulgate criteria and testing procedures for identifying characteristics of the ash which potentially pose a threat to human health and the environment, taking into consideration all pathways of exposure, including inhalation, ingestion from the food chain or potable water from runoff or leaching into groundwater, and dermal contact. The owner or operator of a municipal waste incineration facility, or any facility involved in the transporting, handling, storing, treating, reusing, recycling or disposing of ash, may be required by the Administrator to test the ash. Any ash which fails such a test in any characteristic shall be treated or disposed of in a double-liner, double-leachate collection system disposal facility described in subsection (b)(1), and shall not be reused.

A permit of similar authorizing action in accordance with section 4005(c) is required for any facility involved in the treatment, storage, reuse, recycling or disposal of ash from municipal solid wste incineration units, and shall be issued after public notice and opportunity for informal public hearing in accordance with section 7004(b)(2). Permits shall contain schedules for compliance with corrective action orders and assurances of financial responsibility for completing such corrective action.

The Administrator is authorized to issue a corrective action order whenever the Administrator determines there is or has been a release of any hazardous constituent from any facility regulated under this section. The Administrator may bring a civil action for appropriate relief, including a temporary or permanent injunction, in the United States district court in which such facility is located. Any corrective action order issued by the Administrator shall specify the nature of the corrective action required and shall specify a time for compliance. Any person failing to comply with such order shall be liable for a civil penalty, not to exceed $25,000 per day of noncompliance, assessed by the Administrator.

All facilties treating, storing or disposing of municipal solid waste incinerator ash are subject to proper closure, post-closure monitoring and care, and financial responsibility assurances requirements promulgated under this section.

DISCUSSION

Ash from municipal solid waste incineration units is regulated under the Solid Waste Disposal Act, often called the Resource Conservation and Recovery Act (RCRA), which incorporates a hazardous waste regulatory regime under subtitle C, and a non-hazardous management and regulatory regime under subtitle D. Under current law, municipal incinerator ash is subject to subtitle C or subtitle D depending on whether it passes or fails the extraction procedure (EP) toxicity test among other characteristics. Under this test, an acidic solution is run through the ash, and the pollutants in the resulting leachate are measured. If the leachate contains pollutants above certain cut-off levels, it is characterized as hazardous and must be managed and disposed in accordance with requirements of subtitle C.

Tests conducted by government agencies, the Environmental Defense Fund and other organizations have demonstrated that municipal incinerator ash, especially incinerator fly ash, often has hazardous characteristics. While there has been concern expressed that the EP toxicity test is not appropriate for municipal incinerator ash, as the ash creates an alkaline rather than acid environment, there is also recognition that the varied constituency of the municipal waste stream makes it likely that ash would at least some times fail a toxicity test. The current situation makes planning for ash treatment and disposal difficult, if not impossible, because ash which one day passes the toxicity test might fail the next. Different handling and disposal requirements are triggered on the basis of a test whose results cannot be predicted from day to day.

The reported bill establishes a specific regulatory program for municipal incinerator ash which is protective of human health and the environment but is not contingent upon testing. The program includes regulations for the management, handling, storage, treatment, transportation, recycling, reuse, recycling and disposal of ash from municipal waste incineration units which meet the requirements of section 3001(i) (1) and (2) of the Solid Waste Dispotal Act. This means it applies to ash from facilities that have made the maximum effort to exclude hazardous waste. It also excludes ash from incinerators which themselves are subject to the provisions of subtitle C. This regulatory program will give States and localities the predictability regarding incinerator ash management and disposal needed to foster incineration as a viable solid waste management option.

Recognizing that incinerator ash does not consistently fail toxicity tests, it will not be regulated as a subtitle C waste. Acknowledging that it does sometimes fail toxicity tests and therefore requires more stringent regulation than subtitle D provides, municipal incinerator ash is regulated under a new section of subtitle D which applies only to ash from nonhazardous municipal waste incineration units. The legislation authorizes a comprehensive regulatory program covering all aspects of ash management including handling, treatment, transportation, reuse, recycling, storage and disposal. Regulations shall be promulgated within one year of enactment. Regulations may establish requirements which apply specifically to fly ash, specifically to bottom ash, or to combined fly and bottom ash.

No later than one year after enactment the Administrator shall promulgate criteria and testing procedures for identifying characteristics of incinerator ash which might pose a hazard to human health or the environment. The Administrator shall consider all potential pathways of human and environmental exposure, including but not limited to, inhalation, ingestion of any food or soil particles contaminated by ash or any constituent of ash, ingestion of potable water or aquatic organisms contaminated by surface runoff, leaching, percolation into groundwater or surface water, or dermal contact. The criteria and testing procedures shall at a minimum consider methods to determine leaching, total chemical analysis, respirability, and toxicity.

The Administrator may require testing of ash in accordance with the criteria and procedures promulgated pursuant to this legislation by any owner or operator of any municipal waste incineration unit or any facility involved in any way in the handling, storage, transporting, treating, reusing, recycling or disposing of incinerator ash. The Administrator may require testing of fly as separately, bottom ash separately, or combined ash.

The Administrator is directed to promulgate regulations for treatment of incinerator ash which would render the ash non-hazardous. As defined in section 1004(34) of the Solid Waste Disposal Act, treatment could include any method, technique or process to change the physical or biological character or composition of the ash which would result in its being non-hazardous; but simply combining bottom ash and fly ash, without introduction of a chemical stabilization agent or other processing or neutralization techniques, does not constitute treatment for the purposes of this legislation.

Regulations promulgated under this section shall require disposal of ash from municipal solid waste incineration units, as defined in section 131(k) of the Clean Air Act, in landfills with two or more liners and a leachate collection system above and between the liners, and a groundwater monitoring system. Both liners shall be designed, operated and constructed of materials which prevent migration of any constituent into the liner during the operational life of the facility, including post-closure monitoring period. A lower liner constructed of a layer of recompacted clay or other natural material of at least three feet in thickness satisfies this requirement if its hydraulic conductivity is no more than 1×10^{-7} centimeter per second. Ash which has been tested and fails in any characteristic under the testing procedures and criteria promulgated under this section and which has not subsequently been treated and rendered non-hazardous, shall be disposed of only in a landfill which meets the requirements defined in this paragraph.

Ash which has not failed in any characterisic under the promulgated testing procedure and criteria or which has been treated and rendered nonhazardous may alternatively be disposed of in a single-lined monofill with a groundwater monitoring system. Such a monofill must be located, designed and operated in a manner which assures there will be no migration of any constituent into the groundwater or surface water at any future time. This is the same standard as under section 3004 (d), (e) and (g) and 3005(j)(4) of the Solid Waste Disposal Act. The single liner must be designed, operated and constructed of materials which prevent the migration of any constituent into the liner during the operational life of the facility, including any post-closure monitoring period.

Regulations shall include post-closure monitoring requirements and corrective action requirements, including financial responsibility. The Administrator is authorized to assess civil penalties up to $25,000 a day for noncompliance with any corrective action order.

TITLE IV—AMBIENT AIR QUALITY STANDARDS

NATIONAL AMBIENT AIR QUALITY STANDARDS RESEARCH

SUMMARY

Section 401 of the bill amends sections 108 and 109 of the Clean Air Act to accelerate development of criteria documents and promulgation and review of National Ambient Air Quality Standards. New criteria documents for each of the regulated pollutants are required every 5 years with updates at 2 and 4 year intervals. The Administrator also is required to review and revise (or reaffirm) each standard within 24 months of the publication of a new criteria document, but not later than 5 years after the previous review. In addition, section 103 of the Act is amended to require an annual report to the Congress from the Agency on the basic research program which is being conducted in support of the standards effort and the steps which the Administrator has taken to accelerate the standard-setting and review process.

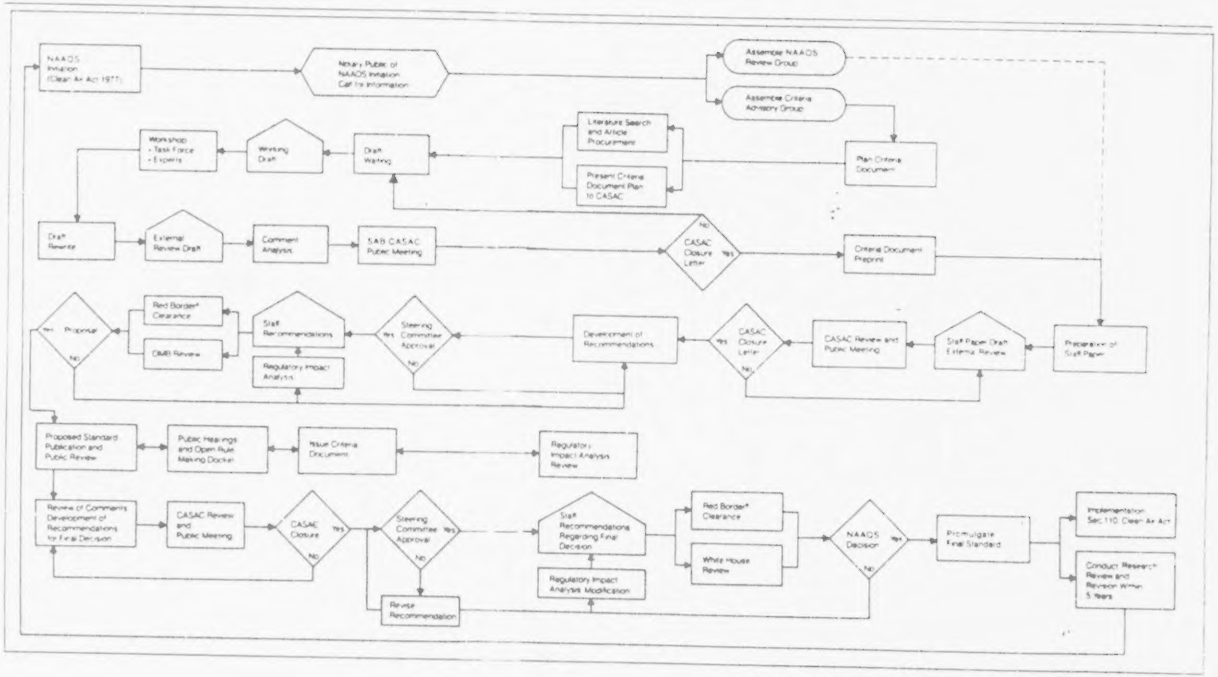
DISCUSSION

National Ambient Air Quality Standards (NAAQS's) are at the heart of the Clean Air Act. NAAQS's include both primary standards to protect public health with an adequate margin of safety and secondary standards to protect the environment and other welfare values. Standards have been promulgated by the Agency for six "criteria" pollutants: sulfur dioxide, nitrogen dioxide, ozone, particulates, carbon monoxide and lead. Standards are based on so-called criteria documents which are compendiums of health and environmental effects research on the pollutant summarizing the information that the Administrator is to consider before promulgating a standard. NAAQS's apply to ambient air quality and each of the 247 ambient air quality regions in the Nation are required to be in compliance with each of the NAAQS's. Today, many large cities are not in compliance with the ozone or carbon monoxide standards and even in rural areas, particulates continue to reach harmful levels. NAAQS's are achieved through control of sources of air pollution (both stationary and mobile sources) mandated in State Implementation Plans (SIPs) required under section 110 of the Clean Air Act. Deadlines for compliance with primary standards are included in the law and areas not in compliance are subject to sanctions. Secondary standards are to be achieved within a "reasonable time," but no final compliance date is mandated.

The process of setting National Ambient Air Quality Standards has become long and complex. EPA has written a flow chart (Figure IV. 1.) for the entire process from the commencement of criteria review under section 108 to promulgation of a standard under section 109 which indicates that it takes 57 separate steps to set a standard. There are four different organizational units of the Agency and several different documents involved.

Figure IV. 1.

Description of EPA's Air Quality Standard Setting Process


NAAQS Initiation (Clean Air Act 1977)
Notary Public of NAAQS Initiation Call for Information
Assemble NAAQS Review Group
Assemble Criteria Advisory Group
Workshop
- Task Force
- Experts
Working Draft
Draft Writing
Literature Search and Article Procurement
Present Criteria Document Plan to CASAC
Plan Criteria Document
Draft Rewrite
External Review Draft
Comment Analysis
SAB CASAC Public Meeting
CASAC Closure Letter
Yes
No
Criteria Document Preprint
Yes
Proposal
No
Red Border* Clearance
OMB Review
Staff Recommendations
Regulatory Impact Analysis
Steering Committee Approval
Yes
No
Development of Recommendations
CASAC Closure Letter
Yes
No
CASAC Review and Public Meeting
Staff Paper Draft External Review
Preparation of Staff Paper
Proposed Standard Publication and Public Review
Public Hearings and Open Rule Making Docket
Issue Criteria Document
Regulatory Impact Analysis Review
Review of Comments Development of Recommendations for Final Decision
CASAC Review and Public Meeting
CASAC Closure
Yes
No
Steering Committee Approval
Yes
No
Revise Recommendation
Staff Recommendations Regarding Final Decision
Regulatory Impact Analysis Modification
Red Border* Clearance
White House Review
NAAQS Decision
Yes
No
Promulgate Final Standard
Implementation Sec 110 Clean Air Act
Conduct Research Review and Revision Within 5 Years

*Formal senior management review of options for setting standards and their supporting documentation

Source: "Research and Development: A Method for Examining Policy Implementation. A Study of Decisionmaking for the National Ambient Air Quality Standards, 1964-1984," Michael Berry, Deputy Director, Environmental Criteria and Assessment Office, Research Triangle Park, North Carolina, 1984.

The first step in the process is the compilation of a criteria document. This (frequently multi-volume) document is a compendium of all the research available on the health and environmental effects of the pollutant of concern. This document is prepared by the staff of the Office of Research and Development in the Agency.

A second document is prepared by the air quality program staff (in the Office of Air Quality Planning and Standards). This is called the staff paper. It summarizes and highlights the research reviewed in the criteria document and recommends a standard or range of standards to the Administrator.

A third group called the Clean Air Scientific Advisory Committee (CASAC) reviews the criteria document and the staff paper and sends a "closure letter" to the Administrator when it is satisfied that the documents it has reviewed reflect an adequate summation of the science. CASAC was established by the 1977 amendments to the Clean Air Act. It is composed of academic and industrial scientists who independently review and comment on the work of the Agency. Quite often CASAC will identify gaps in the criteria document or staff paper and ask for amendments or addenda before closure is given.

The final actor in this long chain of events is the Administrator of the Environmental Protection Agency who, after reveiw of the recommendations from staff and CASAC, may issue a proposed standard which may be promulgated after a period of public comment.

When the Clean Air Act was first put in place in 1970 it took about 12 months to complete the series of activities leading up to a final standard. Today, it can take as long as 120 months. This inordinately long period for review and consideration is in conflict with effective implementation of the Act. For instance, although the Congress mandated, as a part of the 1977 amendments, a thorough review and revision of all the standards, only two of the reviews have been completed to date.

A variety of problems—including poor contractor control and staff work (according to the findings of a GAO report issued earlier this year)—have plagued the program, but the principal problems seem to occur only after the recommendations have gone to the Administrator review. Because of the instability in the leadership of the Agency during the 1980s, there has been much wasted motion in the NAAQS's standard-setting process. Too often, as the review process has closed on a decision, key personnel have left the Agency, and successors have insisted that the headquarters portion of the review process be begun all over again. And by the time the new decision-makers have become comfortable with the evidence, the documents on which the determination is to be made have aged and CASAC has recommended that the entire process be restarted with a fresh look at the science.

The reported bill is intended to address these problems. It amends sections 108 (criteria documents) and 109 (NAAQS's) of the Act to separate the chain of 57 steps into two pieces—one to produce up-to-date criteria documents (that is, timely science) and one to produce standards. The two remain connected in that standards are based on the criteria and can only be proposed after the criteria have been published, but the amendments proposed here are intended to keep the science continually updated so that a delay or reversal at any point in the process does not require a return to the very beginning.

Both the criteria development process and the standard-setting review are put on five-year cycles by this legislation. After a criteria document is published, the Administrator has 6 months to propose either a revision or reaffirmation of the standard. If it is to be revised, the final promulgation must be no later than 18 months after proposal.

Immediately upon completion of a criteria document (and without awaiting the fate of the standard-setting process as happens under current policy) the staff returns to review of the new science. Updates (in the form of addenda rather than revisions) of the criteria document are to be published at 2 and 4 year intervals and a complete revision is due again at the end of five years. This assures that fresh science will be available, if the standard-setting process needs to be restarted at any point.

In addition to these modifications in the standard-setting process the legislation also requires an annual report to Congress on the basic health and environmental effects research which supports the preparation of criteria documents and the steps which EPA will otherwise take to accelerate review. The first such report is due within 12 months of enactment and is to be updated annually. The reports will describe five elements: 1) the current schedule for review and revision of each of the NAAQS's; 2) measures taken to incorporate new science into the revision of criteria documents; 3) the basic research program for each criteria pollutant including identification of the open questions and associated studies; 4) measures to accelerate the standard-setting process; and 5) a 5-year budget and schedule for the activities to implement sections 108 and 109 of the Act.

The United States Government has spent $320 million on basic research in support of the criteria development process and $28 million on review efforts in this area the Clean Air Act was last reauthorized in 1977. It is important that the research be well-focused on the open questions and that the review and promulgation process by sufficiently expeditious to take advantage of fresh science. The annual report is intended to provide that focus.

AIR QUALITY STANDARDS

SUMMARY

Section 109 of the Clean Air Act is amended to require the Administrator to promulgate four primary and two secondary National Ambient Air Quality Standards for six pollutants, unless, based on criteria issued pursuant to section 108 of the Act, the Administrator finds that a standard (or standards) is not requisite to protect public health allowing an adequate margin of safety (in the case of the four primary standards) or public welfare (in the case of the secondary standards).

The primary or health-based standards (and their promulgation dates after enactment) are for: one-hour sulfur dioxide exposures (12 months); daily ozone exposures (36 months); short-term nitrogen dioxide exposures (48 months); and acid aerosols (60 months). The welfare-based, secondary standard for very fine particles to protect visibility would be due in 24 months; and the secondary standard to protect crops and forests from seasonal ozone exposures would be due in 36 months.

DISCUSSION

The bill requires the Administrator to establish new National Ambient Air Quality Standards for six pollutants each of which is discussed below. In addition to the specific issues raised with regard to each of the pollutants, some general issues including a possible determination by the Administrator not to issue a standard, judicial review of a no-standard determination, and the schedule for promulgating and implementing the standards are raised by these amendments.

General Issues.—Each of the requirements for the six, new NAAQS's contained in the reported bill is expressed in a similar form, "The Administrator shall, not later than . . . months after the date of enactment of this subsection, promulgate a national . . . ambient air quality standard for . . . which is consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such a standard is not requisite to protect public health allowing an adequate margin of safety (or welfare)." This general format raises several issues.

The Administrator is required to promulgate a standard unless he or she finds that it is not requisite to protect public health or welfare. This does not require the Administrator to "prove the negative." The Administrator simply must find that a standard is not requisite. On 14 occasions over the past three years, the Administrator has published in the *Federal Register* a determination not to promulgate a NESHAP under section 112 for an air pollutant of concern. Although no endorsement of any one or all of those decisions is implied, they do demonstrate that the Administrator may conclude that a national standard of a particular type is not necessary to achieve the objectives of the Act.

A determination by the Administrator not to promulgate a standard is a final agency action subject to judicial review. The standard of review is the same as would apply under section 307(d)(9) in the event the Administrator issues a standard, that is, the determination may be reversed on a showing that it was "arbitrary and capricious, an abuse of discretion or otherwise not in accordance with law".

In the past the Administrator has decided not to issue new standards, even after they were recommended by staff or CASAC, on the grounds that the evidence for the standard was insufficiently conclusory to withstand legal challenge. The amendments added here are predicated on evidence which is sufficient for the Congress (and many others including Agency staff and members of CASAC) to conclude that a standard is indicated. Thus, a determination not to issue any one of these standards, will require thorough justification by the Administrator based on criteria documents required and developed pursuant to section 108. It must also be said that the Administrator is responsible for proposing and conducting the research necessary to support standard-setting. Thus, a judgment that the research is insufficient to come to a conclusion may be a judgment on the Administrator's own conduct of other responsibilities assigned to the Agency under the Clean Air Act.

Each of the standards are required by a specified date. Failure to promulgate the standard (or issue the contrary determination) may subject the Administrator to citizen suits under section 304 of the Act. The overall schedule reflected in these amendments is carefully considered to balance two concerns: (1) the current status of the review process necessary to produce a well-grounded standard; and (2) the need to coordinate the implementation of the standards with overlapping effects.

After the standards are promulgated they will be implemented according to the provisions of section 110 of the Act. That section provides States a period of 9 months to submit implementation plans to achieve the standard. The Administrator must approve or disapprove each SIP submitted within four months. A State plan for a primary standard may only be approved, if it shows attainment within three years. Attainment of any secondary standard must be projected within a "reasonable time."

Primary Standard for Sulfur Dioxide.—Sulfur dioxide (SO_2) is a poisonous gas which as an air pollutant results principally from the combustion of fossil fuels (coal and oil) at stationary sources. It is also emitted by copper smelters located in the Western United States.

There are currently two National Ambient Air Quality Standards for SO_2, one of 0.14 parts per million averaged over a three-hour period and one of 0.03 parts per million measured on an annual arithmetic mean. These standards have been under review since 1978 and many staff papers and comments by the Clean Air Scientific Advisory Committee (CASAC) have been forwarded to the Administrator in the interim. As sulfur dioxide is the principal pollutant of concern in the phenomenon called acid rain, action by the Agency to revise the NAAQS's for SO_2 has, more than once, been side-tracked by police disputes in the acid rain debate. Both the staff of the Agency's air quality office and CASAC have recommended that a one-hour standard be proposed for public comment as a part of this review. CASAC's "closure letter" on the most recent staff paper and addendum included the following statement:

> . . . that the scientific evidence supporting the establishment of a new 1-hour standard is stronger than it was in 1983. As a result, and in view of the significance of the effects reported in . . . clinical studies, there is strong, but not unanimous support for the recommendation that the Administrator consider establishing a new 1-hour standard for SO_2 exposures. The Committee agrees that the range suggested by EPA staff (0.2 ppm—0.5 ppm) is appropriate . . .

The bill reported here would require the Administrator to promulgate a one-hour NAAQS for sulfur dioxide, unless the Administrator determines that such a standard is not requisite to protect public health with an adequate margin of safety. A new standard or determination not to issue such a standard would be required no later than twelve months after the date of enactment.

Peak short-term (less than one-hour) ambient air concentrations of sulfur dioxide well in excess of 0.5 ppm have been measured in the vicinity of large and small sources of sulfur dioxide emissions (Thrall, 1982; Armstrong, 1985, 1986; EPA, 1986; Kilkelly and Robertson, 1985) and in urban areas (Rote and Lee, 1983). Such concentrations appear likely to occur around numerous small sources of sulfur dioxide with relatively high frequency. Studies using human subjects indicate that both healthy and sensitive persons (10 to 20 percent of the population) are vulnerable to the effects of sulfur dioxide, experiencing bronchoconstriction (Amdur, 1953; Lawther, 1975; Melville, 1970); a greater prevalence of persistent chest colds, allergies, and coughs in children (Stern, 1984); shortness of breath and wheezing (Kagawa, 1979; Sheppard, 1981); and eye, nose, and throat irritation (Kirkpatrick, 1982). Studies have shown that asthmatics can be up to 20 times more sensitive to the effects of sulfur dioxide than healthy adults (Koenig, 1980, 1981, 1982).

Human exposure studies indicate that changes in pulmonary functions and consequent symptoms are likely in a large percentage of freely breathing asthmatics performing light to moderate exercise comparable to climbing stairs, lifting and carrying relatively lightweight packages, light bicycling, walking at a fast pace, or jogging, when exposed to concentrations of sulfur dioxide between 1.0 and 2.0 ppm for 5 to 10 minutes. Similar responses have been observed in adult asthmatics exposed to sulfur dioxide concentrations of 0.75 ppm and 0.6 ppm (Linn, 1983, 1984). Several studies report significant asthmatic responses at sulfur dioxide concentrations of 0.5 ppm while performing moderate to heavy exercise (Kirkpatrick, 1982; Bethel, 1983; Roger, 1985). At sulfur dioxide concentrations of 0.4 ppm, asthmatics performing moderate to heavy exercise show changes in pulmonary function (Linn, 1983).

Some asthmatics sensitive to sulfur dioxide are at risk of experiencing significant bronchoconstriction requiring termination of activity and/or medical intervention when exposed to sulfur dioxide concentrations of 0.4 ppm or greater while performing at least moderate activity. Expert opinion indicates that the effects observed at sulfur dioxide concentrations of 0.5 ppm would affect an individual's lifestyle by causing discomfort, an increase in medication usage, or discontinuance or restriction of activity.

Cold (less than 6° C or 43° F) and/or dry air exacerbates the effects of sulfur dioxide in exercising asthmatics. This is potentially significant in areas of the country such as the Ohio River Valley and the Northeast which experience high levels of sulfur dioxide pollution during winter months.

Since, for an area at or near the recommended one-hour standard, 5 or 10 minute peak concentrations will be higher than the standard (indications are that the peak will be within a factor of 2 of the standard), a one-hour standard would have to be set at a lower concentration to protect against public health effects resulting from 5 to 10 minute exposures. For example, to prevent exposure to sulfur dioxide of 0.4 ppm or greater for durations of 5 to 10 minutes, a one-hour standard including provision for an adequate margin of safety would require a standard no higher than 0.20 ppm.

Control of sulfur dioxide emissions may also produce welfare benefits. Because emissions of sulfur dioxide are a precursor to pollutants which contribute to acid deposition and visibility degradation. Control of emissions to meet a one-hour standard may result in reductions of acid deposition and of regional haze which impairs visibility.

The primary sources of sulfur dioxide emissions in the United States are utilities which emit 67 percent of the total, industrial boilers which account for 11 percent, and primary copper smelters which emit 6 percent. A one-hour sulfur dioxide standard set at 0.5 ppm is estimated to result in somewhat more stringent control of sources than exists today, reducing sulfur dioxide emissions by 6.4 million tons per year; whereas at 0.2 ppm, reductions in sulfur dioxide emissions would be more significant, achieving an estimated 11.2 million tons per year reduction.

Primary Ozone Standard.—Ozone (O_3) is an air pollutant (the principal ingredient of smog) which results from the reaction of nitrogen oxides, volatile organic compounds and sunlight in the atmosphere. It typically occurs at harmful levels during the late spring and summer months and exhibits a daily cycle which peaks from mid-afternoon to early evening. Ozone and its precursor pollutants can be transported over long distances and pollution episodes may last for several days.

There is currently a primary (health-based) National Ambient Air Quality Standard for ozone—0.12 parts per million averaged over a one-hour period. The ozone standard was modified in 1979, increasing the permissible level from 0.08 ppm to the current level. EPA is now in the second review of the primary standard for ozone. This review is considering more recent research on the health effects of this pollutant which indicate adverse effects over prolonged periods of exposure (periods ranging from 6 to 12 hours more accurately reflecting the typical ozone episodes occurring during summertime daylight hours) at levels near or below the current standard. Since section 109 requires that NAAQS's protect public health with an adequate margin of safety, adverse effects at or near the standard may be cause for modification or for the promulgation of a supplemental standard intended to protect against effects which may occur from other than one-hour peak episodes.

The legislation requires the Administrator to consider the need for a second primary ozone standard (in addition to the current one-hour standard which may be reaffirmed or modified based on the pending review). This new standard would be added to the list under section 109 unless the Administrator determined that it was not requisite to protect public health with an adequate margin of safety. It would address subchronic effects and would be based on an averaging period of from 6 to 12 hours. The Administrator's decision on the need for the standard would be due not later than 36 months after the date of enactment.

Epidemiological studies of children in day camp settings have found statistically significant responses to ozone down to 0.06 ppm, a linear increase in lung decrement with increased exposure time, and decreased lung function which lasted about a week following exposure for one hour to ozone above the current standard and four days of exposure to ozone at the level of the current standard

(0.12 ppm). (Children inhale a greater volume of air than adults due to their higher ventilation rates (Lippman; Lioy, 1985).)

A panel of health scientists appearing before the Committee indicated that substantial information on these prolonged exposure effects—decreases in lung function causing discomfort and coughing, lung damage, and restriction of normal activity—would become available over the next 2 to 3 years. Results from an EPA study of prolonged exposure of healthy, young adult men performing moderate exercise to ozone levels at and below the current standard for 6.75 hours are expected to be completed in 1988.

Initial data from an early stage of this study, at ozone levels of 0.12 ppm, found lung function decrements similar in magnitude to those previously observed for other subjects exposed to much higher ozone concentrations over a shorter time period. Under ambient exposure conditions similar to those of this study, the more ozone-responsive individuals may be unable to continue their normal activities due to the severity of respiratory symptoms and lung function decrements. There is evidence that prolonged exposures to 0.12 ppm at lighter exercise levels produce larger acute effects.

Animal studies support the need for an ozone standard to address prolonged exposure. Pulmonary lesions have been shown to result from ozone exposure of 0.2 ppm over 7 days. EPA has noted that because all species tested show similar morphological responses to ozone exposure, there is no reason to believe that humans exposed to ozone would not respond in a similar way. A study on rats of one to seven days of exposure to concentrations of ozone of 0.2 ppm and to the same level of ozone in combination with sulfuric acid at concentrations of 40 $\mu g/m^3$ showed mild pulmonary inflammation or edema and fibrotic changes in the lung, with roughly twice the effect observed when exposure occurred in the presence of sulfuric acid. California (over 10% of the Nation's population) has experienced ozone levels at or greater than 0.2 ppm for 180 days in one year.

Other research shows that major damage to the immune defense system occurs in animals during 3-hour and subchronic exposure to ozone levels of 0.08 and 0.1 ppm respectively.

Primary Standard for Nitrogen Dioxide.—Nitrogen dioxide (NO_2) is a poisonous gas which results primarily from the combination of atmospheric nitrogen and oxygen during the combustion of hydrocarbon fuels at high temperatures. It is emitted in large quantities (approximately 21 million tons per year nationally) by both stationary and mobile sources. Nitrogen dioxide is also a precursor of ozone pollution and acid deposition.

There is currently a National Ambient Air Quality Standard for nitrogen dioxide which was established in 1971 and which is 0.053 parts per million averaged over an annual cycle. All but a few counties in California are in compliance with the NAAQS for NO_2.

Because the NAAQS's, were promulgated on a swift schedule in the early 1970s, there was doubt as to whether they reflected the best scientific judgment of the air pollution problems of highest concern (as to the pollutants, the averaging time and the allowable ambient concentrations). To address that concern the Congress requested the National Academy of Sciences to review the promulgated NAAQS's and make recommendations for modification. The NAS report which was delivered to the Congess before the last reauthorization (1977) generally confirmed the standards that had been set, but indicated a concern for peak exposures to nitrogen dioxide over short-term periods. In response to the NAS study, the 1977 amendments to the Clean Air Act required the Administrator to review the health effects data on short-term exposures to NO_2 and to decide whether an additional NAAQS was necessary.

In response to the 1977 amendments, EPA reviewed existing data for a short-term (over a period of not more than 3 hours) standard for nitrogen dioxide, and in 1982 proposed not to establish a short-term NO_2 standard. After adverse public comment on this proposal, EPA decided in 1985 that not enough reliable data existed to support a decision one way or the other and deferred a determination until a later date. However, both the Agency and its Clean Air Scientific Advisory Committee indicated that there is some limited evidence of short-term health effects of concern. In 1985, EPA identified and approved (with CASAC) a program of research on the short-term effects of nitrogen dioxide. However, the research has not been conducted and may ultimately be sacrificed to what the Agency describes as more pressing concerns.

The legislation reported here is like the 1977 amendments in that it requires the Administrator to consider the need for a short-term NO_2 NAAQS to protect public health with an adequate margin of safety. Unlike the 1977 amendments, the Administrator is not authorized to decline to promulgate a standard because sufficient research to make an "ironclad" case is not available. The Administrator must determine either that a short-term NO_2 standard is requisite to the protection of public health or that it is not. The determination will be based on the research available. If the Agency believes the current information to be inadequate (which it does) and can specify the research that is needed (which it has), it is incumbent upon the Agency to perform or contract for that research between now and the date on which the determination is due—48 months after the date of enactment of the reported bill.

Recent human exposure research at the University of Rochester of middle-aged to elderly adults having chronic obstructive pulmonary disease (i.e., chronic bronchitis or emphysema) performing moderate exercise for 10 minutes showed significant effects on pulmonary function after 2.5 hours and after 4 hours of exposure to nitrogen dioxide at 0.30 ppm. These effects were observed whether the degree of chronic obstructive pulmonary disease was mild or moderate to severe (Bauer, 1986; 1987). Other studies of low level exposures of healthy adult males to nitrogen dioxide, insufficient to produce any pulmonary functional deficit, show enzymatic changes in their lungs and bronchi. This research is especially notable because one-hour ambient air concentrations of nitrogen dioxide have been measured in the United States at 0.40 and 0.50 ppm.

By the time EPA conducted the 1985 review, human exposure research had become available that indicates the inhalation of nitrogen dioxide at 0.30 ppm intensifies exercise-induced bronchospasm and airway hyperreactivity after cold air irritation in asthmatic adults. These results were observed in 2 separate studies. (Bauer, 1984; 1985; Roger (EPA), 1985)

Other research included in EPA's 1985 review is limited, but the effects of nitrogen dioxide on the respiratory system have been most extensively delineated and appear to be of concern in terms of acute health implications. The continuum of observed nitrogen dioxide effects ranges from death or irreversible pulmonary damage from accidental high exposure primarily in the workplace to less severe but significant short term tissue damage, functional impairment, and exacerbation of other disease processes. Human exposure, epidemiological, and animal toxicology studies exist which characterize a variety of respiratory system effects from exposure to lower concentrations of nitrogen dioxide comparable to ambient air levels. Collectively, these studies provide evidence that human health effects may occur as the result of exposure to nitrogen dioxide concentrations approaching or falling within the range of recorded ambient air levels.

Exposure of healthy adults to nitrogen dioxide at 0.05 ppm with concentrations of ozone at 0.025 ppm and sulfur dioxide at 0.11 ppm for 2 hours showed increased sensitivity to a bronchoconstrictor (von Nieding, 1977). Exposure of asthmatics to nitrogen dioxide at 0.1 ppm for one hour have shown increases in airway resistance and sensitivity to a bronchoconstrictor (Orehek, 1976). Exposure of asthmatics and bronchitics, when analyzed together, to nitrogen dioxide at 0.5 ppm for 2 hours results in significant changes in lung function and some reported chest discomfort, dyspnea, headache, and/or slight nasal discharge (Kerr, 1979).

One epidemiological study of Japanese schoolchildren shows some correlation between decrements in lung functions and concentrations of nitrogen dioxide, which ranged during testing from 0.02 to 0.19 ppm on an hourly basis (Kagawa and Toyama, 1975). Epidemiological study results of exposure of children in residences with gas stoves have been interpreted as suggesting that repeated peak short-term exposures to nitrogen dioxide may be associated with increased incidence of respiratory illness in young preschool-age children and small decrements in lung function in school-age children (Speizer, 1980; Spengler, 1979).

Animal studies have shown changes in lung function and morphological alterations in lung tissue following exposure to concentrations of nitrogen dioxide at 0.2 and 0.25 ppm. Nitrogen dioxide exposures causing increased vulnerability to infections in animals have been observed across a wide range, beginning at concentrations of 0.5 ppm for repeated exposures and 2.0 ppm for single 3-hour exposures. These latter results are interpreted as supporting the initial conclusions from the gas stove studies that repeated exposure to daily peak concentrations of nitrogen dioxide may increase the vulnerability of exposed young children to infectious respiratory diseases.

Primary Standard for Acid Aerosols.—Acid aerosols, principally sulfates, sulfuric acid, nitrates and nitric acid, are the atmospheric transformation products of air pollutants which are otherwise addressed under the Act by National Ambient Air Quality Standards (sulfur dioxide and nitrogen dioxide). After imposition of NAAQS's in the early 1970s many stationary sources increased flue gas stack height and took other measures to increase dispersion of these pollutants to assure that the NAAQS's were met in local areas. These measures contribute to the long range transport of SO_2 and NO_2 and their transformation byproducts. As the pollutants move downwind they are transformed into these other compounds (acid aerosols) not subject to the ambient air quality standards under the Act. They, nevertheless, may cause substantial injury to public health and damage to natural resources (principally as acid deposition).

The Environmental Protection Agency is currently reviewing its standard for sulfur dioxide and as part of that review the Clean Air Scientific Advisory Committee (CASAC) has recommended to the Administrator that consideration be given to the promulgation of an additional NAAQS for acid aerosols if the evidence is sufficient to establish a health-based, primary standard. Agency staff have prepared a paper on the subject which has recently been reviewed in a workshop setting.

The reported bill requires the Administrator to promulgate a primary acid aerosol standard, unless it is not requisite to protect public health with an adequate margin of safety. This determination must be reached not later than sixty months after the date of enactment, reflecting the fact that the review is now only in its earliest stages. However, nothing would prevent the Administrator from accelerating this schedule, if the necessary health effects information is available and it is appropropriate to issue this new primary standard so that implementation might be coordinated with the one-hour SO_2 standard, the visibility standard and the acid rain control program mandated by Title II of this legislation.

Annual mean mortality rates that have been correlated with secondary pollutants transformed in the atmosphere from emissions of sulfur dioxide and with constituents of particulate matter are most strongly correlated with sulfuric acid and sulfates. Controlled exposure studies in humans and animals provide evidence that acid aerosols produce greater changes in respiratory mechanical function and rates of particle clearance than other constituents of ambient particulate matter. Human health effects have resulted from the inhalation of ambient acid aerosols (Kitagawa, 1984), and there is evidence that excess respiratory morbidity results from current North American levels of exposure.

Human, animal, and epidemiological studies have been conducted that provide evidence of potential human health effects due to the inhalation of acid aerosols or acid aerosols in combination with other pollutants. Three human exposure studies conducted since 1983 of adolescent asthmatics found significant acute decreases in lung function as a result of exposure to sulfuric acid at 68 $\mu g/m^3$ and at 100 $\mu g/m^3$, and to nitric acid at 50 ppb (Koenig, 1983; 1985; 1987-paper). Effects observed at 100 $\mu g/m^3$ were confirmed by a second study. The population having hyperresponsive bronchial airways is estimated to be 10 percent of the Nation's population, or about 25 million people.

Although ambient monitoring of acid aerosols conducted to date has been limited to special studies, a peak ambient concentration of acid aerosols (sulfur particles) has been measured in North America on the north shore of Lake Erie at 100 $\mu g/m^3$ (Spengler, 1986), and ambient concentrations of nitric acid have been measured in California at 50 ppb (Pitts).

A study of animal exposure to sulfuric acid and ozone found biochemical changes, including an inflammatory or edema response in lungs and fibrotic changes, at combined concentrations of 40 $\mu g/m^3$ of sulfur acid and 0.2 ppm of ozone. Roughly twice the effect was observed when the sulfuric acid was present compared to ozone exposure alone (Last, 1987). A study of the response of experimental animals to repeated exposures of sulfuric acid mist that is currently underway has shown that modest exposure levels and short daily exposure times resulted in production of hyperresponsive airways in previously healthy animals. These data are consistent with epidemiological studies conducted in Ontario with children attending summer camps. Further, once the airways become hyperresponsive, subsequent exposure to other stimuli such as air pollutants or cold air has been shown to result in bronchoconstriction similar to that seen in asthma.

Several epidemiological studies show human health effects correlated with sulfuric acid and sulfates. Summertime admissions to a hospital in Ontario, Canada for acute respiratory disease are estimated to have increased 5 percent on days when high levels of ambient sulfates were measured. Asthma admissions increased while total admissions declined over the 4-year study period, during which period, sulfate concentrations increased and other pollutants had reduced concentrations. This study also found that elevated ambient ozone levels appear to contribute to the effect of sulfate on respiratory morbidity (Bates and Sizto, 1985; 1987). An analysis of daily mortality rates in 98 metropolitan areas in the United States in 1980 show that among the aerosol indices available, ambient sulfate levels correlated most closely with mortality (Ozkaynak and Spengler, 1984). An epidemiological study conducted in 6 U.S. cities has found that exposure to acid aerosols, particularly to fine particulates associated with total sulfate loadings, produces respiratory symptoms in school children. A marked increase in prevalence of bronchitis occurs as the concentration of fine airborne particles increases. This effect is seen both in children with a prior history of wheezing, as well as in children without such history. However, the effect is greater among children who wheeze.

EPA's Office of Air Quality Planning and Standards has drafted a staff paper requested by CASAC, and CASAC will review these findings in early 1988 to determine whether development of a criteria document on acid aerosols is warranted. The National Institute of Environmental Health Sciences has undertaken a study of 24 cities that will include ambient monitoring of acid aerosols. The monitors for 8 cities in this study should be in place by mid-1988, and are part of a three-year program. This network should provide needed ambient measurements of acid aerosols within the five-year timeframe for promulgation of a standard as provided for in this subsection.

Secondary Standard for Very Fine Particles.—Air pollution is most noticeable to the general population as the impairment of visibility. In the Nation's cities, brown clouds, haze, and visible plumes from smoke stacks are indicators of invisible and visible gaseous air pollutants and particulates. This visibility impairment is usually tolerated until the reduction in visibility becomes so severe that major features of interest are lost in the haze and colored air that hang over many metropolitan communities. In rural areas, particularly parks and wilderness areas, an impairment of visibility may cause significant harm to public welfare. In the East, the reduction in visiblity is severe and widespread. In contrast, the American West is generally noted for its pristine air, magnificent scenery, and endless vistas.

"Visibility" integrates several factors including the clarity or haziness of the atmosphere, the total distance over which objects can be seen, and the discernable details of line, texture and form. Haze conditions can reduce contrast, cause distant objects to disappear, and nearby objects to be discolored or "flattened."

A major cause of visibility reduction is particulates. These may be emitted directly from a source, or they may be formed from gaseous emissions. Particles smaller than 2.5 micrometers are typically formed from gaseous emissions (sulfur dioxide (SO_2) transformed to sulfates (SO_4); the particles travel long distances, and significantly reduce visibility. Efforts to limit air pollutants which are subject to National Ambient Air Quality Standards, such as sulfur dioxide, will have some visibility benefits; however, an ambient air quality standard for very fine particles is a more direct and equally appropriate means for preserving and improving visibility values.

When EPA conducted its 1984 review of the National Ambient Air Quality Standard for particulate matter, the Clean Air Scientific Advisory Committee found that the relationship between visibility and ambient very fine particles (<2.5 micrometers) is well defined. However, EPA decided to defer action on a welfare-based standard to protect Eastern visibility and visibility in Western urban areas because of the interaction of such standards with programs for control of the acid rain phenomenon. In July, 1987 the Agency published an Advanced Notice of Proposed Rule-Making soliciting public comment on a visibility-based very fine particle standard.

Various statistical studies indicate that visibility reduction in the East is closely tied with high sulfate concentrations. The median visual range for natural background conditions (in the absence of manmade air pollution) in the East is estimated to be 60 (±30) miles. Median visual range in the East based on observations at 100 airports in that region is currently about 13 miles.

In its 1984 review, EPA cited findings of increased occurrence of episodic Eastern regional haze since 1948, especially during the summer months, with increased occurrences of visibility less than 7 miles. Between 1948 and 1972, visibility reduction changed from local to a regional phenomena. Eastern regional haze can be observed in satellite photographs, as haze blobs in the summer that cover several States, and that maintain cohesiveness for several days tracked over thousands of kilometers. Estimates of annual benefits from visibility improvements based on four studies in 10 cities reported by EPA in its 1984 review range from approximately $1 billion to $1.5 billion for the 31 eastern States.

When visibility drops below 3 miles, the Federal Aviation Administration restricts flights in controlled air spaces to those aircraft equipped with the proper instrumentation. Under these conditions, certain general aviation flights are grounded. EPA has estimated that fine particulate matter may have impeded air traffic in the eastern and midwestern United States about 2 percent of the time annually.

Where natural vistas (with potential visibility in the 200 mile range) have been integral to the character of a local area, the loss of those vistas can be measured in many ways. It can mean a loss of tourists, revenues, or property values. Visibility is measured objectively, as well, through measurements of contrast change, visual range, and loss of color and detail.

Among the qualities that make natural parklands in the United States so valuable are the scenic vistas, colors and geological features, all of which can be obscured by haze. Visibility monitoring by the National Park Service has indicated that scenic vistas are affected by pollution at all 35 NPS monitoring stations (in the contiguous 48 States) more than 90 percent of the time. Sulfates are the most important contributor to visibility impairment in national parks, except in the Northwest where fine carbon particles are more prominent (NAPAP, 1987).

The bill requires the Administrator to promulgate a secondary National Ambient Air Quality Standard for very fine particles, those with an aerodynamic diameter smaller than or equal to 2.5 micrometers, unless the Administrator finds that such a standard is not requisite to protect visibility. This standard must be promulgated or the contrary determination must be made not later than 24 months after the date of enactment.

The very fine particle secondary standard reinforces Congressional intent to improve visibility where it is presently being degraded and reduce future impairment by human activities. Visibility conditions vary greatly across the country due to differences in natural conditions and air pollutant concentrations. In rural Western areas, a very fine particle standard might well be designed in a manner that would promote a return to natural visibility levels.

It is understood that certain particulate types (such as sulfates and nitrates) grow to a larger size due to their affinity for water under conditions of high relative humidity and are therefore potentially more important to visibility impairment than other particulate types. Establishing a very fine particle standard should take into account the relative importance to visibility of the various fine particle components. Humidity and the averaging time of the standard are important factors to consider. An averaging time should be selected that permits progress in visibility improvement, over appropriate timeframes ranging from hours or days to months or years.

A very fine particle standard may allow for different measurement parameters in different parts of the Nation. While sulfates have been shown to be the predominant cause of visibility impairment in all areas of the country, in the Pacific Northwest carbonaceous constituents play a more important role. In the future, nitrates may well become the principal visibility concern in many areas of the West. One approach may be to base standards for different areas on the most significant elemental concentrations present in the total very fine particle mass. Development of the very fine particle standard should be done in coordination with EPA's efforts under section 169A of the Clean Air Act to develop regional haze visibility regulations.

Secondary Standard for Ozone.—For more than two decades, ozone has been known to harm crops. Alone, or in combination with other air pollutants like sulfur dioxide and nitrogen dioxide, ozone causes up to 90 percent of the Nation's air pollution-related crop losses (Heck, Larsen and Heagle, 1980).

Extensive studies have been done on the effect of ozone on crop plants as part of the National Crop Loss Assessment Network (NCLAN) program demonstrating that virtually all field crops display reduced growth at ambient levels of ozone during the growing season, i.e. 0.04 to 0.06 ppm for the average maximum 7-hour daily mean averaged over the growing season (compared to growth at natural concentrations of about 0.025 ppm). Large differences in the rate of damage occur across crops and within species of the same crop.

The Office of Technology Assessment in its 1984 report described the effects this way:

> . . . if ozone concentrations had been reduced to natural, background levels in 1978, corn yields would have increased by 2 percent, wheat by 5 percent, soybeans by 13 percent, and peanuts by 24 percent. As measured in 1978 crop prices, ozone caused a 6- to 7-percent loss of agricultural productivity . . . this represents about $2 billion of (farm income).

One-third of the total land area of the United States is forested; two-thirds of that area—nearly 400 million acres, most of it located in the eastern United States—is commercial timberland. Scientists have recently discovered evidence of significant productivity declines in several tree species grown commercially from New England to Georgia. In response to these discoveries, new research on the impacts of air pollution on forested areas is being conducted. A significantly body of experimental data on the response of seedlings and young trees to ozone in the ambient range of concentrations is emerging.

In a study by Reich and Amundson (1985) a decrease in net photosyntheis which was linear with respect to both dose and concentration was observed in four tree species: hybrid poplar, sugar maple, northern red oak and eastern white pine. Reduced photosynthesis for a significant period reduces plant growth. Several recent studies exposing seedlings of a wide variety of species to ozone have detected reduced growth (Kress and Skelly, 1982; Reich and Amundson, 1985; Cappelka and Chevone, 1986).

The scientific evidence from these earlier studies indicates that trees may be adversely affected by chronic ozone exposures over the entire ambient range, even when visible damage is not present. For an average maximum 7-hour daily mean between 0.05 and 0.08 ppm the relationship appears to be linear, but some recent experiments (Hogsett et al., 1985) show that peak hourly concentrations are also important. The ozone impacts initially alter key physiological processes in the foliage of trees, resulting in impairment of photosynthesis, which in turn may reduce individual tree growth. These relationships are generally true for both conifer and hardwood forests.

While results to date are based primarily on studies of seedlings, tree physiologists believe the effects also would occur in mature trees.

Acute ozone events of high concentrations for short periods quickly produce symptons in tree foliage that is noticeable. An exposure of a few hours per day at 0.15 ppm seems to be the starting point for acute damage to trees. Such damage will progress with increased concentrations, durations or frequency of ozone exposure. In extreme cases it is likely that tree crowns and, therefore, forest canopies become thin due to leaf or needle loss.

Ozone data in forested areas remote from major urban centers are limited in North America today. But enough information is available to estimate the ambient ozone concentration in regional forests of the eastern United States. The average 7-hour daily mean for the growing season east of the Mississippi ranges from a high of about 0.065 ppm with short-term peaks above 0.10 ppm in the Appalachian Range to a low of 0.03 ppm in Florida. About one-quarter to one-third of the forested land area in the eastern United States is exposed to ozone concentrations about twice the natural background levels (that is, 0.04 to 0.06 ppm). It would appear therefore that all seedlings and saplings, if not all trees, are experiencing some reduced photosynthesis, and possibly reduced growth, based on the data reported above. The potential role of ozone at ambient levels in regional forest effects may be important both in low-elevation forests that do not show visible damage and in above-cloudbase forests that do.

The current secondary standard for ozone under section 109 of the Clean Air Act is the same as the primary standard, 0.12 ppm averaged over a one-hour period. There is more than sufficient evidence to indicate that this standard is not protective of agricultural crops and forests as the Clean Air Act requires. Damage, with significant economic implications, is now occurring, at ambient levels (0.04 to 0.06 ppm) which are well below the standard (0.12 ppm). And the damage results from prolonged exposures averaged over daily 7-hour exposure period for the growing season.

The reported bill requires the Administrator to promulgate a new secondary standard for ozone to protect forests and agricultural crops not later than 36 months after the date of enactment. As with other secondary standards, States will be expected to amend their SIPs to assure compliance. There is, however, no deadline by which attainment must be demonstrated.

PM10 INCREMENTS

SUMMARY

To recognize the recent modification in the National Ambient Air Quality Standard for particulate matter which shifted the base of measurement from total suspended particulates (TSP) to particles smaller than or equal to 10 micrometers in size, the Administrator is authorized to make a substitution of so-called PM10 increments under the part C (prevention of significant deterioration) program for the TSP increments currently in place. This substitution may be made provided that the new increments are at least as stringent in effect as the existing increments for which they are substituted. The provision also authorizes the owner or operator of any source subject to part C of the Act to satisfy the requirements of section 165(a)(3)(A) by demonstrating equivalent compliance with the existing increment for total suspended particulates in terms of PM10.

DISCUSSION

In 1977 the Clean Air Act was amended to include the program to prevent significant deterioration (PSD) of air quality in areas that are in attainment with the National Ambient Air Quality Standards. For some NAAQS's, those amendments established "increments" of impact on air quality not to be exceeded by emissions from new or modified sources locating in attainment areas including statutory increments for total suspended particulates.

In July 1987, the Agency promulgated a modified NAAQS for particulate matter shifting the base for measurement from total suspended particulates to particles that are smaller than or equal to 10 micrometers in size. This new standard is called PM10 and substitutes for the old TSP standard. The modification was made as more recent health effects data demonstrated that it was the smaller particles, inhaled deeply into the lungs, which caused the principal threat to public health. Measurements of TSP could not reliably capture the extent of this threat, since they may have been overwhelmed by the presence of large particles (not capable of penetrating so deeply into the lung tissue).

This section of the reported bill authorizes the Administrator to modify the allowable increments of degradation for new and modified sources included in current law so that they are measured as PM10 rather than TSP. This modification shall be made so as to assure that the increments substituted will be at least as stringent in effect as those for the current standard. Since the current increments based on total suspended particulates are statutory, this substitution requires statutory authority.

The provision also allows owners and operators of facilities subject to the PSD requirements a means to demonstrate compliance with the increments in a manner consistent with the new PM10 NAAQS until such time as the Administrator actually promulgates the substitute increments.

HIGH-ALTITUDE CARBON MONOXIDE STANDARD

SUMMARY

Section 404 of the bill requires the Clean Air Scientific Advisory Committee to review the information available on the health effects of carbon monoxide at high altitudes and to make a recommendation to the Administrator within 2 years as to whether a separate National Ambient Air Quality Standard for high-altitude carbon monoxide is necessary.

DISCUSSION

The Agency has already promulgated (in 1971) two National Ambient Air Quality Standards for carbon monoxide (CO), a poisonous gas emitted principally from mobile sources. One standard, averaged over one hour, is 35 ppm. A second standard, and the one for which many cities are in non-attainment status, is averaged over eight hours and is 9 ppm.

The impact of carbon monoxide at high altitudes has been of concern for some time, since the diminished availability of oxygen at high altitudes may aggravate the ill effects caused by CO exposure. For instance, in 1975, the States of California and Nevada, acting jointly, established an eight-hour CO standard of 6 ppm for the high-altitude Lake Tahoe area. In 1980, the National Commission on Air Quality held a workshop on the high altitude problem. The general consensus reflected at that meeting indicated that so long as the standard is expressed in volumetric terms (that is in parts per million)—rather than in gravimetric terms (mg/m^3)—the effect of altitude would be accounted for in the measurement of the pollutant. And thus, a separate high altitude standard for CO may not be necessary. When it reaffirmed the existing CO standards in 1985, the Environmental Protection Agency made the volumetric measurement the principal form of the standard and stated its belief that the high altitude problem was resolved.

There continues to be a concern with respect to the high altitude question and to assure that it is thoroughly reviewed in light of the most current information, and that adequate research on the question continue, the bill requires CASAC to make a formal recommendation to the Administrator as to the justification for listing high-altitude carbon monoxide as a criteria pollutant under section 109. The recommendation is to be forwarded to the Administrator not later than 24 months after the date of enactment of this legislation.

TITLE V. HAZARDOUS AIR POLLUTANTS

Background Discussion

The air toxics problem in the United States is one caused both by routine releases of hazardous air pollutants from the every day operation of our modern economy and by sudden, catastrophic events which result from the accidental loss of control over those facilities and activities which produce and use extremely hazardous substances.

Routine Releases.—Section 112 of the Clean Air Act provides for the regulation of hazardous air pollutants, substances which "cause or contribute to air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness". Under sections 109 and 110 of the Act, EPA has regulated six "criteria" pollutants (for instance, sulfur dioxide or carbon monoxide) which are emitted into the air in quantities measured in the millions of tons per year and for which significant ambient concentrations can be detected in most locations in the United States.

Hazardous air pollutants regulated under section 112 are presumably of a different character. There are a smaller number of large point sources. Emissions are measured in the thousands of tons per year. And it is the concentrated pollution within the vicinity of a source, rather than ambient levels, which are of concern.

(There are exceptions to this characterization, including pollutants like benzene and products of incomplete combustion, which have become ubiquitous in the human environment, but which are treated as hazardous air pollutants under section 112.)

Air pollution, rather than drinking water or food supply, is the principal source of human exposure to toxic substances. A 1981 study by the Environmental Protection Agency indicated that of the top 20 toxic pollutants of concern in two or more media, 80 percent of the total toxic discharge was to the air. The average dosage for the typical person was greater from air pollution than from drinking water for 13 of the 16 pollutants for which a comparison could be made.

According to a 1985 EPA study, just 17 toxic air pollutants cause an estimated 2,000 excess cancers in the United States each year. This estimate does not account for the carcinogenic effects of hundreds of other toxic air pollutants (States have established concentration limits for 708 different air toxics) or the negative health effects other than cancer which can be attributed to toxic emissions including birth defects, sterility, central nervous system damage, mutations, organ toxicity, and irritation of eyes, nose, throat and skin. In addition to the direct effects of these pollutants, they may also add to the total body burden of contaminants by deposition in surface water systems used for drinking water and through bioaccumulation in the food chain.

It is not only the national cancer toll that is of concern. Another important aspect of the air toxics problem is an equity issue. The risks associated with exposure to toxic air pollutants are not spread evenly over the whole population. Those living near concentrated industrial activity may face very high lifetime cancer risks due to toxic emissions. Estimates by EPA indicate that some persons living near industrial facilities routinely releasing 1,3-butadiene may face excess cancer risks as high as 3 to 10. Coke oven emissions at 42 sites across the nation pose risks of 2 excess cancers for each 100 persons experiencing maximum exposure.

The problem of high individual risks reaches beyond those living near large point sources to include millions of other Americans living in heavily-polluted urban centers. EPA's 1985 study also looked at risks from the mix of chemicals present in urban airsheds. It was common to find an additive risk for 15 to 20 pollutants in the range of 1 excess cancer for every 1000 persons. A recent study of the air toxics problem in the Los Angeles metropolitan area indicated that as many as 222 cancers per year in that community could be attributed to toxic air pollutants (principally benzene emitted from gasoline supplies).

There are also environmental effects from these pollutants. For instance, 20 to 25 percent of all the toxic pollutants reaching the Great Lakes are generated as air emissions and are deposited from the atmosphere. Atmospheric deposition is the major source of toxic air pollution—estimated at 80 percent of the total—for the upper Great Lakes including all of Lake Superior. Even for Lake Michigan, where wastewaters containing toxic pollutants were discharged into the lake for years before controls were imposed, the atmosphere is now the source of 50 percent or more of the toxic loading. Environmental effects of these toxics include increased disease in fish and loss of bird populations that depend on the Great Lakes basin as the foundation of the food chain. Toxic pollutants like carbon tetrachloride can also contribute to dramatic changes in global processes through ozone depletion and climate change.

Figure V. 1. provides a description of 60 toxic substances routinely released in huge quantities in the United States each year. The figure lists the sources of these pollutants, known health effects, cancer risks for the most exposed persons and an estimate of the annual emissions for each pollutant.

FIGURE V.1.—INFORMATION ON SELECTED AIR TOXICS

Pollutant	Major source categories of emissions	Selected Health Effects	Maximum individual risk	Estimated Emissions (pounds/year)
Acetaldehyde [1]	Stationary fuel combustion, solvent use, chemical industry.	Respiratory irritant		3,929,310
Acrolein [1]	Solvent use, chemical industry.	do	1.00 × 10-4	91,507
Acrylonitrile [1]	Chemical industry	Lung and colon cancer	3.8 × 10-3	4,992,120
Allyl Chloride [1]	do	Liver toxicant; kidney and lung effects.	1.3 × 10-6	899,640
Ammonia	do	Severe eye, skin and respiratory irritant.		242,790,345
Arsenic	Copper and lead smelters, pesticide production and use, stationary fuel combustion.	Lung, skin, scrotum, and lymphatic system cancer.	2.3 × 10-2	18,000,000
Asbestos	Mining and milling of asbestos ores, construction and demolition of buildings, vehicle brake linings.	Lung cancer, mesothelioma (pleural and peritoneal cancer), asbestosis (lung ailment).		500,295
Benzene	Motor vehicles, coke ovens, gas marketing, chemical industry.	Cancer, leukemia	8.0 × 10-3	260,509,725
Benzyl Chloride [1]	Chemical industry	Respiratory irritant, skin and eye effects.	3.0 × 10-5	83,790
Beryllium [1]	Stationary fuel combustion, coke ovens, metal processing.	Lung cancer	7.4 × 10-4	359,415
1,3-Butadiene	Chemical industry	Cancer; mutations	3 × 10-1	10,445,085
Cadmium [1]	Metal processing, stationary fuel combustion, chemical industry.	Lung and prostate cancer; lung and kidney effects.	3.6 × 10-3	1,047,375
Carbon Tetrachloride [1]	Fumigant, lab use, storage and marketing, chemical industry.	Liver cancer	5.8 × 10-4	60,597,810
Chlorine	Stationary fuel combustion, chemical industry.	Severe eye, mucous membrane, and skin irritant.		1,358,218,160
Chlorobenzene [1]	Solvent use	Liver toxicant		175,782,600
Chloroform [1]	Solvent use, chloronation, wastewater, chemical industry.	Cancer; central nervous system effects.	3.0 × 10-3	15,302,700
Chloroprene [1]	Chemical industry	Reproductive effects; suspect carcinogen; respiratory irritant.		1,847,790
Chromium	Stationary fuel combustion, cement production, coke ovens.	Lung and nasal sinuses cancer.	1.6 × 10-1	6,215,895
Coke Oven Emissions [1]	Coke ovens	Lung, kidney and prostate cancer.	2.0 × 10-2	105,619,500

FIGURE V.1.—INFORMATION ON SELECTED AIR TOXICS—Continued

Pollutant	Major source categories of emissions	Selected Health Effects	Maximum individual risk	Estimated Emissions (pounds/year)
Copper	Metal processing, pesticide production and use, chemical industry.	Respiratory irritant		(2)
Cresols (ortho, meta and para isomers) [1]	Solvent use, metal processing, disinfectant, cleaning compound, chemical industry.	Skin irritant; liver kidney and pancreas effects.		24,636,465
p-Dichlorobenzene [1]	Space deodorant, moth control.	Liver toxicant		50,013,810
Diesel Particulate Emissions	Motor vehicles, stationary generators.	Cancer		(2)
Dimethyl Nitrosamine [1] (DMNA)	Chemical industry	do	5.4 × 10–5	216,090
1–4 Dioxane	Solvent and degreaser use	Cancer; liver and kidney effects.		(2)
Dioxin [1] (2,3,7,8–TCDD)	Pesticide spraying, combustion of gasoline, diesel fuel and wood.	Cancer		84
Epichlorohydrin [1]	Chemical industry	Lung cancer; leukemia; skin, kidney, liver, and respiratory system effects.	2 × 10–5	478,485
Ethylene Dibromide	Chemical industry motor vehicles, gas marketing.	Cancer; damage to skin, eyes, heart, liver, spleen, respiratory and central nervous systems.	1.6 × 10–4	1,951,425
Ethylene Dichloride [1] (EDC)	Chemical industry, motor vehicles, gas marketing.	Cancer, nervous system, respiratory, heart and liver effects.	3.6 × 10–3	142,884,000
Ethylene Oxide [1]	Fumigant, sterilant, chemical industry.	Leukemia, stomach cancer; mutations.	6.8 × 10–3	12,524,400
Formaldehyde [1]	Chemical industry, motor vehicles, stationary fuel combustion.	Cancer lung effects	6.8 × 10–3	1,256,850,000
Gasoline Vapors	Gasoline marketing	Cancer		2,277,765,000
Hexachlorocyclopentadiene [1]	Chemical industry	Eye, nose, throat and lung irritant.		59,500
Hydrogen Sulfide	Mining, refining, decomposition of organic, matter, manufacturing processess.	Acute effects, nervous and respiratory system effects.		(2)
Maleic Anhydride [1]	Chemical industry	Eye irritant		3,316,320
Manganese [1]	Metal processing, stationary fuel combustion, battery production, coke ovens.	Nervous system toxicant		3,064,980
Mercury	Sludge incineration, ore processing facilities battery manufacture.	Central nervous system effects.		(2)
Methyl Bromide	Fumigant	Nervous system toxicant lung irritant.		(2)
Methyl Chloroform [1]	Solvent use, adhesives, aerosols, a pint.	Anesthetic effects, mutagen, nervous system, liver and heart effects.		469,166,670
Methyl Isocyanate	Chemical industry, pesticide production.	Pulmonary irritation and sensitization; eye, mucuous membrane and skin irritant.		(2)
Methylene Chloride [1]	Solvent use, aerosol and foam blowing.	Cancer; elevates carboxyhemoglobin, central nervous system effects.	2.6 × 10–5	441,901,845

FIGURE V.1.—INFORMATION ON SELECTED AIR TOXICS—Continued

Pollutant	Major source categories of emissions	Selected Health Effects	Maximum individual risk	Estimated Emissions (pounds/year)
Naphthalene	Chemical industry	Hemolysis (breakdown of red blood cells); eye irritation.		263,277
Nickel [1]	Stationary fuel combustion, motor vehicles, metal processing.	Nasal cavity, lung and larynx cancer; skin effects.	1.6 × 10-5	22,451,210
Nitrobenzene [1]	Solvent use	Toxic anemia	1.2 × 10-6	6,685,560
Nitrosomorpholine [1]	Corrosion inhibitor, polishes, optical brightener.	Cancer	1 × 10-6	10,050,390
Perchloroethylene [1]	Solvent use, dry cleaning	do	4.6 × 10-4	317,703,015
Phenol [1]	Chemical industry	Lung, heart, liver and kidney toxicant; eye and central nervous system effects.		5,305,230
Phosgene [1]	Chemical industry	Mutations; respiratory irritant.		200,655
Polychlorinated Biphenyls (PCB) [1].	Transformers, waste incineration.	Cancer; skin, liver and reproductive effects.		1,346,160
Polycyclic Organic Matter (POM).	Stationary fuel combustion, motor vehicles.	Cancer		33,760,755
Propylene Oxide [1]	Chemical industry	Mutations; irritant	3.0 × 10-2	82,775,700
Radionuclides	Uranium mining & milling, nuclear facilities, coal-fired powerplants, elemental phophorus plants, nuclear waste disposal.	Cancer, mutations; birth defects.		(2)
Styrene	Chemical industry	Eye and respiratory	3.3 × 10-5	12,403,125
Toluene [1]	do	Central nervous system depressant, suspect carcinogen.		2,234,500,695
Toluene Diisocyanate	do	Lung and mucous membrane irritant.		112,455
Trichloroethylene [1]	Solvent use	Cancer; central nervous system depressant.	1.0 × 10-4	189,446,985
Vinyl Chloride	Chemical industry, landfills	Liver, brain, lung, hemotolymphopoietic system, and breast cancer.	3.8 × 10-3	(2)
Vinylidene Chloride [1]	Chemical industry	Liver and kidney toxicant	4.2 × 10-3	147,735
Xylene (ortho, meta and para isomers) [1].	Solvent use and mobile sources.	Respiratory irritant; central nervous system depressant; suspect carcinogen.		963,485,775
Zinc Oxide	Pigment use	Metal fume fever		15,893,640

[1] 37 chemicals on a list of substances under study by EPA since the mid-1970's.

[2] Not available.

Sources: U.S. EPA and Radian Corporation, "Characterization of Available Nationwide Air Toxics Emissions Data," 1984; NIOSH/OSHA, "Occupational Health Guidelines for Chemical Hazardous," January 1981; National Toxicology Program, "Third Annual Report on Carcinogens," September 1983; California Air Resources Board, "A Proposed Policy for Reviewing New or Modified Sources of Toxic Air Contaminants," September 1982; Office of Technology Assessment, "Technologies for Determining Cancer Risks from the Environment," June 1981; EPA, "Vinyl Chloride—A Review of National Emission Standards," February 1982; EPA, "Review of National Emission Standards for Mercury," December 1984; EPA, "Evaluation of Air Pollution Regulatory Strategies for the Gasoline Marketing Industry," July 1984; EPA, "Health Assessment Document for Polycyclic Organic Matter," December 1979; EPA, Radionuclides, Background Information Document for Final Rules," October 1984; EPA, "Health Assessment Document for Hexachlorocyclopentadiene," November 1984; EPA, Unpublished Data, Radian Corp., "Sources and Emissions of Polycyclic Organic Matter," December 1983; Systems Applications, Inc., "Human Exposure to Atmospheric Concentrations of Selected Chemicals," 1980.

Section 112 of the Clean Air Act requires the Administrator to publish a list of the hazardous air pollutants for which he intends to promulgate an emission standard, to publish the proposed standard 180 days after listing and then within 180 additional days to either promulgate the standard or determine that the substance is not, in fact, a hazardous air pollutant. In the 17-year history of the

Clean Air Act, eight substances have been listed as hazardous air pollutants: asbestos; beryllium; mercury; vinyl choloride; radionuclides; inorganic arsenic; benzene; and coke oven emissions.

The actual emissions standards which result from listing are applicable to various sources categories of the pollutant. Standards—called national emissions standards for hazardous air pollutants or NESHAPs—have been promulgated for at least one source category of seven of the listed substances. Figure V. 2. lists the various source categories for which NESHAPs have been established.

FIGURES V. 2.—PROMULGATED NESHAPS

Pollutant	Source category	Promulgation date
Beryllium	Extraction plants	Apr. 6, 1973
	Ceramic plants	
	Processing plants	
	Rocket motor test sites	
Mercury	Chlor-Alkali cell	April. 6, 1973.
	Incineration or Sludge incin	
	Mercury ore processors	
Vinyl Chloride	Vinyl chloride, edc. and PVC plants	Oct. 21, 1976.
Asbestos	Asbestos mills	Apr. 5, 1984.
	Roadways	
	Manufacturer of textile materials	
	Manufacturer of cement products	
	Manufacturer of fire-proofing	
	Manufacturer of flooring	
	Manufacturer of friction products	
	Manufacturer of paper, millboard, felt	
	Manufacturer of coatings, adhesives, etc.	
	Manufacturer of packing and gaskets	
	Manufacturer of plastics and rubber	
	Manufacturer of chlorine	-
	Manufacturer of shotgun shell wads	
	Manufacturer of asphalt concrete	
	Manufacturer of demolition and renovation	
	Spray operations	
	Fabricating operations	
	Insulating material	
Benzene	Equipment leaks	June 6, 1984.
Radionuclides	Elemental phosphorus plants	Feb. 6, 1985.
	Uranium mill tailings	Sept. 24, 1986.
	NRC licensed/non/DOE Federal facilities	Feb. 6, 1985.
	DOE facilities	Feb. 6, 1985.
	Underground uranium mines	Apr. 17, 1985.
Arsenic	Glass manufacturer	Aug. 4, 1986.
	CU smelters (hi)	
	CU smelters (lo)	

The process for setting a standard is long and uncertain. The Agency first conducts a preliminary health assessment on a air pollutant of concern. If the preliminary study indicates possible adverse health effects, a detailed assessment is conducted leading up to the publication of a Health Assessment Document which is reviewed by the Science Advisory Board. After SAB signs off on the health assessment, the Administrator makes a determination as to whether a NESHAP is, in fact, warranted for the pollutant. If the decision is to list the pollutant, further studies on the sources, emissions rates, exposure and control technologies for the pollutant are conducted. Finally, the Administrator may actually list the substance, the sources of emissions and propose standards. The substances currently under review by the Agency are listed according to the stage of review in Figure V. 3.

FIGURE V. 3.—TOXIC AIR POLLUTANT EVALUATION AND CONTROL PROGRAM [1]

Preliminary health and source screening	Detailed assessment	Intent-to-list § 112	Decision not to regulate	Listed under § 112 [4]	NESHAP proposed	NESHAP promulgate
Propylene	Chlorine and HCl	Chromium	Toluene	Asbestos	Benzene	Mercury
Propylene oxide	Phosgene	Carbon tetrachloride	PUM	Beryllium	Coke oven emissions	Beryllium
Ammonia	Acetaldehyde	Ethylene oxide	CFC-113	Vinyl chloride		Asbestos
Styrene	Acrolein	Chloroform	Methyl chloroform	Coke oven emissions		Vinyl chloride
Naphthalene	Hydrogen sulfide	Ethylene dichloride	Epichlorohydrin	Benzene		Benzene
Xylenes	Beryllium [2]	Cadmium	Manganese	Arsenic		Radionuclides
Ethyl chloride	Dibenzofurans	1-3-Butadiene	Chlorobenzenes	Radionuclides		Arsenic
Methyl methacrylate	Asbestos [2]	Methylene chloride	Vinylidene chloride	Mercury		
Maleic anhydride	Dioxins	Perchloroethylene	Hexachlorocyclopentadiene			
Phthalic anhydride	Formaldehyde	Trichloroethylene	Chloroprene			
Mineral fibers	Toluene diisocyanate		Acrylonitrile [3]			
Hydrogen fluoride	Methyl isocyanate		Nickel			
Phosphorus			Phenol			
Sodium hydroxide			Copper			
Hydrocyanic acid			Zinc/zinc oxide			
Selenium and compounds						
Mercuric chloride						
Bromine and inorganic compounds						
Dimethylamine						
Methanol						

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[1] As of August 28, 1987.

[2] Reassessment of original health effects information.

[3] Referred to States for evaluation.

[4] EPA is also regulating wood stove emissions and municipal waste combustor emissions under section 111 (New Source Performance Standards) which will significantly reduce the toxic components of these emissions. Onboard controls for gasoline vapors from vehicle refueling are being developed under Title II of the CAA.

To illustrate the very slow pace of this process, the Agency began preliminary health assessments on 43 high priority air pollutants in 1977. After thorough study this list was further refined to 37 items in 1982. Now 10 years later, only one of the original 37 substances has actually been listed. In 10 other cases the Agency has announced an intention to list a substance under section 112 at some future and unspecified time.

Delay in listing and standard-setting under section 112 has led to concern, criticism and proposals for reform from many quarters over the last several years. In response to these concerns the General Accounting Office was asked to do a thorough review of the NESHAP's process. Its August, 1983 report noted the following as major causes of delay:

> Since EPA listed and regulated several substances in the early 1970's, industry resistance to regulation has grown so intense that EPA believes it must develop the best health case it can to avoid future legal action.
>
> Several factors have contributed to EPA's difficulty in obtaining SAB approval of documents . . . SAB has disagreed with EPA over the sufficiency of the data needed to show cancer-causing effects and over the best method to characterize a substance's adverse health effects . . . Other delays in finalizing health assessment documents are also attributable to SAB review. For example, SAB ran out of travel funds in 1980 and could not hold a scheduled meeting to review the health assessment document on arsenic.
>
> Additional delays have been caused by several policy shifts since 1978 concerning the type of information to be included in the health assessment documents.

To sum up the GAO report, EPA has failed to fully implement section 112 because it expends extraordinary effort preparing the health assessment documents which support a standard, because the process for reviewing these documents is cumbersome and bureaucratic, because the assessment process is conducted in sequential stages, and because basic policies with respect to standard-setting have shifted signficantly from one approach to another over the life of the program.

As if to confirm the conclusions of the GAO report, the Agency has fundamentally restructured the air toxics program on two additional occasions in the 1980's. Appearing before the House Energy and Commerce Committee (Subcommittee on Oversight and Investigations) in November of 1983, the then-Administrator, Mr. William D. Ruckelshaus, made a commitment to substantially accelerate the regulatory process under section 112.

> . . . let me propose the following steps. First, I want to clear the decks of decisions that have been pending for a considerable time. We intend to make decisions on the benzene, arsenic and radionuclide emissions standards as quickly as possible. Next, we will examine the 25 standard-setting projects we have underway and determine which are the most likely to generate major public health risk re-

> ductions. We will concentrate all our resources for producing air toxics rules on these . . . we believe we can complete, by the end of 1985, decisions for approximately 20 to 25 substances on the list of 37 (issued by EPA as priorities for review in 1977). In our judgment, that will account for the overwhelming majority of the public health risk represented by the substances . . . controllable under section 112.

The substances targeted by Mr. Ruckelshaus for NESHAPs decisons at that time were: benzene (already listed); beryllium (already listed); cadmium; carbon tetrachloride; chlorobenzene; chloroform; chromium; coke oven emissions; p-dichlorobenzene; epichlorohydrin; ethylene dichloride; ethylene oxide; freon 113; hexachlorocyclopentadiene; manganese; mercury (already listed); methyl chloroform; methylene chloride; nickel; perchloroethylene; polycyclic organic matter; toluene; trichloroethylene; vinyl chloride (already listed); and vinylidene chloride. EPA has made regular quarterly reports to the Congress on progress with respect to each of these items since 1983 when the commitment was first made.

Now four years later the commitment made by the Administrator may be tested against the actual record laid down by the Agency. Regulations for only one of the major source categories of benzene emissions has been promulgated. The radionuclides standard was set (under threat of a contempt of court citation) at levels which the Agency readily admits did not force any emissions reductions. Only one (coke oven emissions) of the twenty-eight pollutants on the schedule of pending substances has actually been listed for a NESHAP pursuant to section 112. It appears unlikely that the standard for coke oven emissions will actually be promulgated in the near-term.

Thus, the net effect of the November, 1983, commitment to substantially accelerate the NESHAP decision-making process and give air toxics a high priority within the Agency has been to reduce benzene emissions by 6,000 tons per year (annual emissions are 130,000 tons) and arsenic emissions by 23 tons (annaul emissions are 9,000 tons). Although EPA has announced an intention to list 10 of the other 28 pollutants at some time in the future (beyond the minor benzene and arsenic reductions) no other benefit to public health has been accomplished in the four years since the commitment to substantially accelerate the program was made.

In June of 1985 a new EPA Administrator, Mr. Lee M. Thomas, announced a comprehensive air toxics strategy that promised to take the Agency in a radically different direction. The authorities of section 112 were to be largely abandoned as unworkable. The new air toxic strategy emphasized non-traditional sources of pollution, action under other provisions of the Clean Air Act or other statutes and the development of air toxics programs at the State level to assume the responsibility for regulating industrial point sources of toxics emissions.

This new strategy was buttressed by a series of reports, generally called the "Six-Month Study", summarized in a document entitled, "The Air Toxics Problem in the United States: An Analysis of the Cancer Risks for Selected Pollutants".

This report included relatively novel assertions as to the sources of and solutions for the Nation's air toxics problem. First, although the national cancer rates (and other adverse health effects) attributable to air toxics are relatively low (approximately 2,000 cancers per year caused by 17 air pollutants from a total of 440,000 cancer deaths recorded annually), in some areas maximum lifetime risks to the most exposed individuals could be very high (up to 3 excess cancers for every 10 persons exposed for one pollutant).

Second, in addition to risks that could be associated with "traditional" sources of these air pollutants like chemical plants and oil refineries, a significant part of the air toxics problem may also be caused by small and diverse "area sources" including dry cleaners, service stations, wood stoves, and motor vehicles.

Third, controls for conventional pollutants (SIPs for criteria pollutants, new source performance standards, and tailpipe emissions standards) had done more during the previous decade to reduce air toxics emissions than the standards promulgated under section 112.

Fourth, many of the pollutants identified as high priorities in the late 1970's did not warrant national regulation.

And finally, accidental and potentially catastrophic releases of air toxics had become an important aspect of the problem and might appropriately be addressed in a national air toxics program.

The Agency's 1985 air toxics strategy contained five commitments: 1) expanding the focus of the national air toxics control program from solely regulating individual pollutants to also regulating multiple pollutants from different source categories; 2) expanding the program to reduce risk to specific communities with air toxics problems; 3) increasing Federal support of State air toxics programs so that the States could improve their capability to deal with air toxics within their borders; 4) improving emergency preparedness and response for sudden, accidental releases at all levels of government; and 5) beginning new efforts that would give the public the information they need to prevent, prepare for and respond to toxic accidents.

At the same time that Mr. Thomas announced these initiatives he also indicated that four pollutants listed by Mr. Ruckelshaus in November 1983 would not be regulated and that a NESHAP for chromium emissions might be promulgated at some point in the future.

Although there was much to praise in the new strategy (including attention to area sources, standards for source categories rather than individual pollutants, and support for emergency planning and community right-to-know), the strategy quickly became controversial for the elements that appeared to back away from full implementation of section 112. Organizations representing state and local pollution control officials were willing to take on more responsibility for the regulation of air toxics, but only in the context of minimal national standards and with adequate technical support. The proposal to simply dump the 25 sources emitting acrylonitrile in large quantities on the 14 States where they were located was roundly opposed and did not bode well for this element of the program. After some negotiation with the States, the concept of formally "referring" specific pollutants to the States for regulation was dropped from the agenda.

A second aspect of the strategy which caused concern was abandonment of the standard for health protection contained in section 112. The law provides that emissions standards for hazardous air pollutants will be set at a level which "provides an ample margin of safety to protect public health." The other authorities referenced by EPA, both within the Clean Air Act (new source performance standards) and in other statutes (section 6 of the Toxic Substances Control Act, for instance) did not afford the same level of health protection. Had the Congress intended the Agency to balance risks and benefits (as is required under the "unreasonable risk" standard of TSCA) in setting emissions standards for hazardous air pollutants, the Congress could have provided for such considerations in the language of section 112. It did not. It was quite apparent that these other authorities were attractive not so much for their applicability to the air toxics problem, but rather because they would allow the Agency to avoid fundamental questions which are raised by the health protection provisions of the Clean Air Act.

The emergency planning and community right-to-know elements of the 1985 strategy were eventually incorporated into law in the 1986 Superfund Amendments and Reauthorization Act (SARA). The strategy has also led to proposed new source performance standards for wood stoves and for sources of volatile organic compounds from synthetic organic chemical manufacturing plants. However, no emission standard or other proposal included in the 1985 strategy has yet produced actual reductions in the routine release of air toxics or enhanced protetion of public health. As with the commitment for an accelerated effort on the high priority pollutants in November 1983, the 1985 air toxics strategy has not produced significant results to date.

Current section 112 requires EPA to set standards for hazardous air pollutants at the level which provides "an ample margin of safety to protect public health." The most serious dispute in the interpretation of section 112 has been the meaning of this language when applied to cancer-causing substances, for which no "threshold" (no level of exposure below which adverse health effects are not expected to occur) is identifiable. The language of section 112 speaks exclusively of protecting public health. Virtually every authoritative commentator has concluded that section 112 requires EPA to base standards solely on health effects and the measures necessary to eliminate those effects. For instance, in its 1983 report on the section 112 program, the General Accounting Office said:

> While only the courts can resolve definitively the scope of EPA's authority under section 112, GAO believes that, based on GAO's review of section 112, its legislative history, and applicable case law, the Congress intended that EPA establish standards at a level that eliminates significant public health risks. Congress did not intend economic considerations and technological feasibility to be relevant considerations in setting standards. This should require EPA to prohibit any emissions of hazardous air pollutants, if EPA cannot identify a threshold below which emissions would not be expected to cause adverse health effects.

The courts reached the same conclusion for the parallel language of section 109 (authorizing the promulgation of National Ambient Air Quality Standards that are to provide an "adequate margin of safety to protect public health"). Nevertheless, the Agency has asserted that section 112 allows it essentially unrestrained authority to compromise protection of health for reasons of technological feasibility or cost.

It should be noted that the Agency has not always taken this position. In its first three actions under section 112, setting standards for asbestos, beryllium, and mercury in 1973, EPA stated that each standard fully protected health and "was not based on economic considerations." In 1976, however, the Agency asserted in proposing a standard for vinyl chloride that it could limit controls for hazardous air pollutants to a level deemed "acceptable" using "best available control technology" (BACT) and that it would balance control costs against health impacts in deciding the appropriate level of control.

> An alternative interpretation of section 112 is that it authorizes setting emissions standards that require emission reduction to the lowest level achievable by use of best available control technology in cases involving apparent non-threshold pollutants, where complete emission prohibition would result in widespread industry closure and EPA has determined that the cost of such closure would be grossly disproportionate to the benefits of removing the risk that would remain after imposition of the best available control technology.

In the 1980's, EPA has even dropped the requirement for BACT and has proceeded on a straight cost effectiveness basis. The Agency readily acknowledges that the proposed standard for coke oven emissions—a known human carcinogen presenting risks of 2 excess cancers in 100 for the most exposed persons—does not require installation of best available control technology.

The issue finally came before the courts in litigation over vinyl chloride, a known human carcinogen that causes cancer of the liver and brain. In a decision in November 1986, a three-judge panel of the U.S. Court of Appeals for the District of Columbia Circuit ruled, 2-1, that so long as there is some uncertainty over the precise degree of risk presented by a pollutant, EPA may compromise health protection for reasons of cost or feasibility. The majority opinion, by Judge Robert Bork, purported to find the authority for this approach in the "ample margin of safety" language. A strong dissent by Senior Judge Skelly Wright, however, argued that there was no authority for the consideration of cost or feasibility in setting standards under section 112.

The full 11-member Court of Appeals subsequently rejected the panel opinion. The Court vacated the panel decision and reheard the case *en banc*. In July 1987, the full Court ruled unanimously that EPA does not have authority for its cost effectiveness approach. The decision again was written by Judge Bork and represented a major change of position.

The *en banc* decision states that EPA must set emissions standards for hazardous air pollutants which have no threshold for adverse effects (carcinogens) through a two-step process. The first step is to determine a "safe" level of emissions. The second step is to determine what additional emissions reductions should be required in order to assure "an ample margin of safety."

According to the Court, a determination as to "safety" (the first step):

> . . . must be based solely on risk to health. The Administrator cannot under any circumstances consider cost and technological feasibility at this stage of the analysis.

The decision does not, however, equate "safety" with a "risk-free" environment. In fact, the Court invited the Administrator to define a level of risk which is acceptable even after controls on non-threshold pollutants have been imposed:

> . . . we find only that the Administrator's decision must be based upon an expert judgment with respect to the level of emission that will result in an "acceptable" risk to health. In this regard, the Administrator must determine what references should be drawn from available scientific data and decide what risks are acceptable in the world in which we live . . . Of course, if the Administrator cannot find an acceptable risk at any level, then the Administrator must set the level at zero.

Some further insight as to the Court's view of acceptable risk can be had from a subsequent decision which specifically referenced the vinyl chloride case. In *Public Citizen* v. *Young* (Nos. 86–1548 *et al.* decided August 23, 1987) the same Court linked the concept of "acceptable" risk with "de minimis" risk and cited with approval EPA and FDA decisions using a one in one million lifetime cancer risk as the dividing line between risks that are acceptable and those that are not.

Having established "safety" as the point-of-departure for all emission standards promulgated under section 112, the Court postulates a possible second step in the standard-setting process:

> In determining what is an "ample margin" the Administrator may, and perhaps must take into account the inherent limitations of risk assessment and the limited scientific knowledge of the effects of exposure to carcinogens at various levels, and may therefore, decide to set the level below that previously determined to be safe.

As to the role of cost and feasibility, the Court goes on to say:

> It is only at this point that the Administrator may set the emission standard at the lowest level that is technologically feasible. In fact, this is, we believe, precisely the type of policy choice that Congress envisioned when it directed the Administrator to provide an "ample margin of safety." Once "safety" is assured, the Administrator should be free to diminish as much of the statistically determined risk as possible by setting the standard at the lowest feasible level. Because consideration of these factors at this stage is clearly intended "to protect public health"

> it is fully consistent with the Administrator's mandate under section 112.

The net result of the decision is that: 1) the Agency may deem "de minimis" levels of cancer risk "safe" as long as cost or technological feasibility do not enter as considerations in this judgment; and 2) the Agency may, and perhaps must, reduce the level of an emissions standard below the level deemed "safe" to the lowest level technologically feasible in order to provide an ample margin of safety.

Under this ruling, the Agency may be required to reissue already proposed or promulgated standards for four pollutants in addition to vinyl chloride—benzene, radionuclides, arsenic and coke oven emissions. The decision essentially takes the Agency back to the point in 1973 just after standards for asbestos, beryllium and mercury had been promulgated. To expect that the Agency will act swiftly to amend its standard-setting policy and install the Court's interpretation of section 112 in a series of proposed new standards for listed (and yet to be listed) hazardous air pollutants would be to greatly misunderstand the history of this program. It is more likely that, absent Congressional intervention to restore momentum, the Court's decisions will lead to a long interregnum with essentially no effort made to fulfill the mandate of section 112.

Based on the 17-year history of section 112 and the evidence of a continuing, significant threat to public health and the environment from toxic air pollution, several conclusions with respect to routine emissions are warranted:

I. Routine and episodic releases of hundreds of non-criteria air pollutants pose a significant threat to public health in the United States.

II. The risk of adverse health effects, principally excess cancers, from exposure to toxic air pollutants is not distributed evenly across the population. Americans living within the vicinity of concentrated industrial activity or in heavily polluted urban areas may face relatively high risks.

III. Air toxics may also be causing significant environmental damage through deposition and run-off to surface waters, bioaccumulation in the food chain, or disruption of climatic or atmospheric processes.

IV. The Environmental Protection Agency has not made sufficient use of the existing authorities available under section 112 of the Clean Air Act to protect public health.

V. To some extent the statutory language itself may be responsible for the slow pace of the Nation's air toxics program as it requires emissions standards which provide an ample margin of safety to protect public health even for carcinogenic air pollutants where no level of exposure may be considered safe. If interpreted to require standards prohibiting emissions, regulations under section 112 would be potentially very costly for some source categories or pollutants.

VI. The regulatory time frames included in the existing law requiring the proposal of emissions standards within 180 days of listing a pollutant as hazardous and promulgation of standards 180 days later are unrealistic.

VII. A recent court opinion, *NRDC* v. *EPA* (824 F.2nd 1146), invalidated basic premises used by the Agency in the standard-setting process for hazardous air pollutants. This opinion, reversing an EPA decision to withdraw regulations for vinyl chloride emissions, will have implications for the entire program including standards for pollutants already listed. Although listing and regulatory decisions had been scheduled for several other pollutants in the near-term, this opinion is likely to cause additional significant delay as the Agency reassesses its basic policies.

VIII. Some measures proposed by the Agency in its 1985 air toxics strategy offer promise for addressing non-traditional sources of toxic air emissions. However, those proposals are not currently recognized within the structure of section 112 and have no other statutory impetus.

In light of those conclusions, the reported legislation makes fundamental changes in the basic provisions of section 112. The bill establishes a list of 224 air pollutants and a mandatory schedule for issuing emissions standards for the major sources of these pollutants. The standards are to be based on the maximum reduction in emissions which can be achieved by application of best available control technology. These new technology-based standards will become the principal focus of activity under section 112. Authority to issue health-based standards is preserved in modified form to be used for especially serious pollution problems.

This approach to regulation of toxic pollutants is not without precedent. It follows the general model which has been employed since the mid-1970's to control toxic effluents discharged to surface waters by major industrial point sources.

Under the 1972 amendments to the Clean Water Act, industrial dischargers were given two deadlines to control pollutants such as biological oxygen demand, suspended solids, and acidity): 1) by July 1, 1977, each facility was required to meet emissions limitations reflecting "best practicable control technology currently available" (so-called BPT limits); and 2) by July 1, 1983, each facility was to meet emissions limitations set according to "best available technology economically achievable" (BAT).

Toxic pollutants under the 1972 Act were to be treated differently. The Administrator was to publish a list of toxic pollutants within 90 days and within a year promulgate effluent standards that would provide an "ample margin of safety" to protect the most affected (aquatic) organisms. Thus, the structure of this authority to regulate toxic discharges to surface waters was very similar to the current structure of section 112 of the Clean Air Act.

During the 5-year period following passage of the 1972 Clean Water Act, EPA promulgated standards for only 6 toxic pollutants. In 1975 the Environmental Defense Fund and the Natural Resources Defense Council brought suit against the Agency for failure to list more toxics and to promulgate standards as mandated by the Act. In June 1976, EPA and the plaintiffs entered into a consent decree that established a new formula for the development of effluent standards for toxic water pollutants. This agreement created a list of 129 priority pollutants and required EPA to promulgate effluent guidelines based on best available control technology for each pollutant and each industrial category not later than December 31, 1980. Industrial dischargers were to be in compliance with these standards by July 1, 1983, the same deadline as established by the Act for BAT control of pollutants. There were 14,000 dischargers divided into 21 industrial categories and 399 subcategories potentially subject to these new toxics standards.

When it amended the Clean Water Act in 1977, Congres incorporated the basic provisions of the consent decree into the statute. The 129 priority pollutants were listed by law. EPA was given authority to add to the list. Standards were to be promulgated by July 1, 1980, and met by sources on and after July 1, 1984, giving industry time to install the necessary technology. Effluent limitations for toxic pollutants were to be based on the reductions which could be achieved through application of the best available control technology. No discharge could contain a "toxic pollutant in toxic amounts."

The schedules for promulgation and implementation of the effluent standards ultimately proved too ambitious, but with the exception of standards for the synthetic organic chemical manufacturing industry (which were just promulgated) and the pesticide industry (where poor contractor control caused additional delay), the program to control toxic effluents through emissions limitations based on the best available control technology for major industrial categories is now in place.

These technology-based effluent standards for 129 toxic water pollutants are similar in concept to the emissions standards for 224 toxic air pollutants which will be set according to the provisions of new subsection (b) of section 112 of the Clean Air Act reported in this legislation.

The 1987 amendments to the Clean Water Act made further modifications to the toxics program. Under the Water Quality Act of 1987, States are required to undertake a progressive program of toxic pollutant load reduction where BAT-based effluent standards are not sufficient to meet State-established water quality standards (numbers measuring the ambient quality of surface waters, rather than effluent, and set to protect aquatic life and other water uses) or to support public health and water quality objectives of the Act. The State's proposed reduction in industrial toxic discharges, in combination with other controls on point and non-point sources, must achieve the applicable water quality standard not later than January, 1990.

Again there are parallels between this provision of the water program and the amendments to the Clean Air Act made by the reported bill. The Water Quality Act's requirement to go "beyond-BAT" where necessary to protect health or aquatic life is, in concept, similar to the revised authorities included in new subsection (c) providing the Administrator with authority to issue health-based standards when technology-based standards are insufficient to remove all risks of concern caused by toxic air pollutants.

Accidental Releases.—On December 3, 1984, a pesticide manufacturing plant located in Phopal, India, and owned by the Union Carbide Corporation experienced a catastrophic failure that released a cloud of the highly reactive and toxic chemical, methyl isocyanate, over the densely-populated city. More than 2,850 died; 200,000 were injured. This tragedy, or unimaginable dimension until the day it happened, has riveted international attention on the problem of chemical accidents.

In August of the following year—and after countless assertions that "it can't happen here"—129 residents (along with 6 chemical workers) of Institute, West Virginia were sent to hospital emergency rooms by an accidental toxic release from Union Carbide's sister facility (it also produces methyl isocyanate) located in that community. A follow-up inspection by the Occupational Safety and Health Administration at the Institute plant discovered 221 safety and health violations. OSHA proposed a fine of $1.38 million for what it described as "a willful disregard for health and safety."

Chemical accidents with serious effects have become commonplace in the United States. In response to Bhopal, the Environmental Protection Agency began several efforts to determine the scope of the chemical accident problem including compilation of an "Acute Hazardous Events Data Base" which was published in December of 1985. For the period from the beginning of 1980 through mid-1985 the data base lists 6,928 chemical accidents causing 138 deaths, 4,717 injuries, and evacuations of more than 217,000 people.

Accidents were recorded in the data base for all 50 States, the District of Columbia, Puerto Rico and the Virgin Islands.

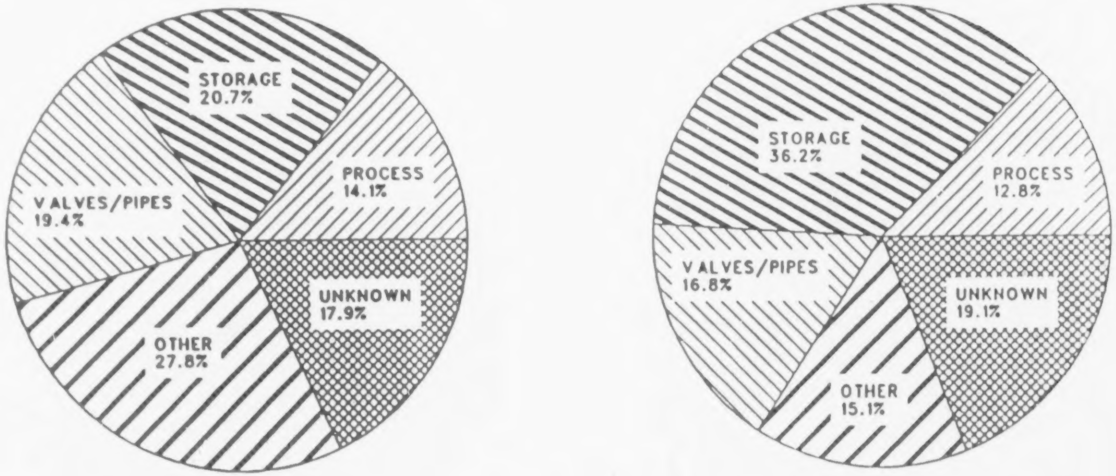
Seventy-five percent of the events occurred at stationary facilities; only 25 percent were transportation-related.

Four high-volume industrial chemicals (chlorine, ammonia, hydrochloric acid and sulfuric acid) were the source of injury or damage in twenty-five percent of the accidents. More than 200 additional substances were released during events that caused death and injury with industrial organic chemicals being responsible for the largest portion of the casualties. At least another 200 substances were released in events that did not produce injury or death.

Among events at stationary facilities, spills were found to be the most likely catastrophic event followed by vapor releases, fires and explosions. As Figure V. 4. indicates, storage vessels, process vessels, and valves and piping contributed nearly equal shares of the reported events, but storage vessels generally resulted in much larger releases.

FIGURE V. 4.

ACUTE HAZARDOUS EVENTS DATABASE



IN-PLANT EVENTS BY LOCATION

ALL EVENTS

NUMBER OF EVENTS = 5179

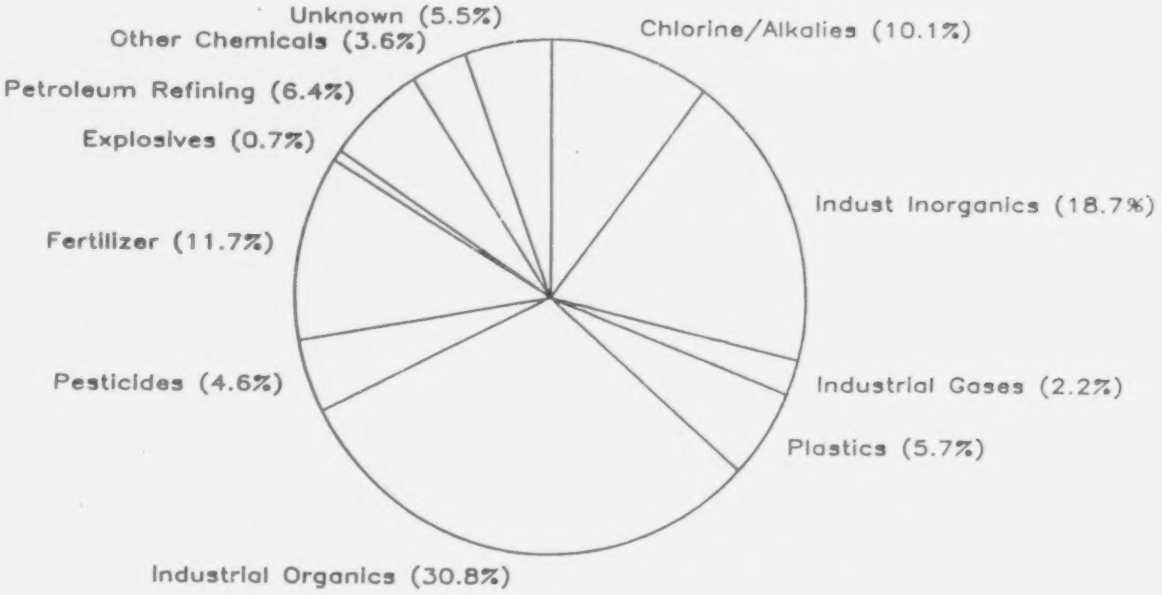
IN-PLANT EVENTS BY LOCATION

DEATH/INJURY EVENTS

NUMBER OF EVENTS = 304

FIGURE V. 5.

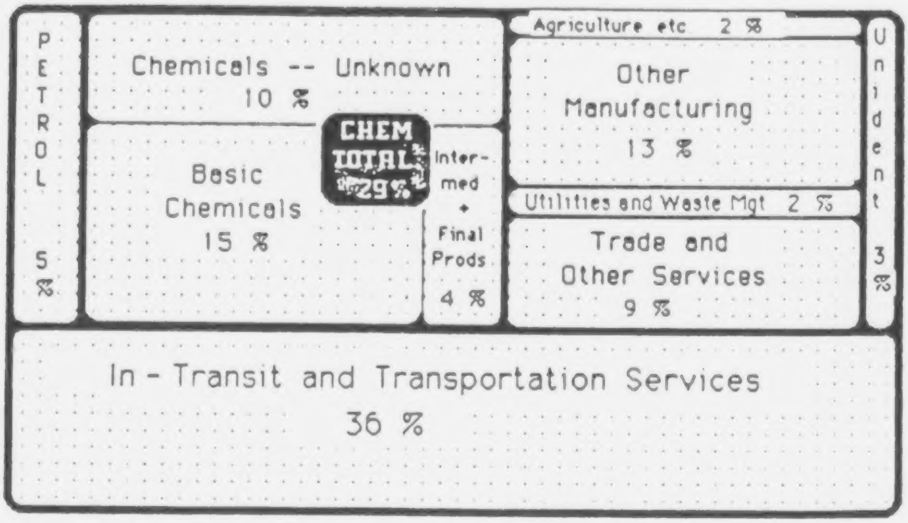
DISTRIBUTION OF EVENTS WITH INJURIES
Contribution of Chemical Categories



NUMBER OF EVENTS = 468

FIGURE V. 6.

Reported Number of Injuries
Distribution by Industry Sector



TOTAL INJURIES · 4717 in five year period

Although the economic impacts of these chemicals accidents are not consistently recorded, one source, documenting 64 accidents over a 28-year period, reports average damages of $30 million per event (in 1984 dollars) with one event resulting in more than $100 million in property damage.

The total quantity of toxic chemicals released in the 6,928 events recorded in the Acute Hazardous Events Data Base exceeds 420 million pounds. It is estimated that the data base includes only one-third to one-half of the chemical accidents which actually occurred during the 5-year period.

To illustrate the nature and impact of these chemical accidents, the following information is drawn from the experience of just one State, New Jersey, and represents only a small portion of the accidents which occurred there during the period 1980–1986. This material is taken from the document, "Basis and Background Document for Proposed New Rule N.J.A.C. 7:31, Toxic Catastrophe Prevention Act Program" dated September, 1987.

> The (New Jersey) Department of Environmental Protection has recorded information on chemical releases in New Jersey since 1980 . . . The number of incidents recorded for the period from January 1980 to May 1986 . . . is 671 emergency incidents . . . affecting 7,673 people. These incidents represent only a part of the releases occurring in the State that involved chemicals, hydrocarbon fuels and noxious materials.
>
> The following are accounts of some of the incidents reported from January 1980 to May 1986. This chronology is intended to illustrate the increased frequency of incidents just prior to and following the accident in Bhopal, India in December, 1984.
>
> > *April 28, 1980.*—Unknown amounts of chlorine dioxide and chlorine escaped to the atmosphere due to employee error. The employee had dumped sodium chloride (NaC102) solution into a 350 gallon phosphoric acid tank, which caused the release. Chlorine dioxide, if inhaled, can cause lung edema, which can cause death. It is a severe eye irritant. Phosphoric acid is an irritant to the skin and eyes. Chlorine, if inhaled, can cause vomiting, cyanosis, and pulmonary edema, which can cause death.
> >
> > *June 17, 1980.*—An unknown amount of toluene diisocyanate (TDI) was spilled due to equipment failure. The release occurred because of a leak in a pressure relief valve. Inhalation of TDI can lead to bronchitis and pulmonary edema. TDI can cause vomiting and is corrosive to the skin.
> >
> > *July 7, 1980.*—Unknown amounts of hydrogen chloride, hydrogen cyanide, and sulfur dioxide were released to the environment in a fire of unknown origin. This major industrial fire lasted six days, and one city block was destroyed. Five hundred people were evacuated. Hydrogen chloride, when breathed, can cause ulcers of the nose and throat, and pulmonary edema, which may be fatal. Hydrogen cyanide can cause cya-

nosis, convulsions, asphyxiation and/or pulmonary edema, which can be fatal. Carbon monoxide, if breathed, causes formation of carboxyhemoglobin which leads to tissue hypoxin (lack of oxygen) and asphyxiation. Persons who recover may have permanent neurologic damage.

October 30, 1980.—An unknown amount of hydrogen chloride mist was released to air due to a chemical reaction malfunction.

January 21, 1981.—Three hundred pounds of sulfur trioxide were released to the environment in an air release at a chemical facility due to equipment failure. a safety disk ruptured while a truck was being filled. Three people were hospitalized. Sulfur trioxide, if inhaled, causes severe irritation of mucous membranes resulting in damage to lungs. It causes severe burns to the skin and eyes.

August 28, 1981.—An unknown amount of chlorine escaped to the atmosphere due to employee error. The release occurred when a storge tank relief valve blew open.

September 15, 1981.—An unknown amount of hydrogen bromide was released to the environment due to equipment failure. A tube connector from a hydrogen bromide receiver broke loose. Three hundred people were evacuated. Hydrogen bromide, if inhaled, can cause irritation of the respiratory tract which can lead to pulmonary edema. Direct contact with skin or eyes will cause chemical burns.

May 18, 1982.—An unknown amount of hydrogen chloride was released to the atmosphere in a spill. Six people were injured and hospitalized.

November 16, 1982.—Three hundred gallons of hydrochloric acid, 160 pounds of methyl chloride, and 1,720 pounds of tetrahydrofuran were released to the environment in an air release due to equipment failure. The release occurred because a pilot plant reactor failed. Methyl chloride, if inhaled, can cause central nervous system depression with convulsion and coma, which can lead to death. Kidney and heart damage may occur, and the chemical is probably teratogenic. Eye contact can lead to conjunctivitis. Tetrahydrofuran can cause injury to the liver and kidneys. It is irritating to the eyes and mucous membranes.

August 11, 1983.—One hundred drums of phosphorus oxychloride were released to the environment in an air release due to employee error. Eighty people were evacuated. Phosphorus oxychloride, if inhaled, can cause corrosion of the respiratory tract which can lead to pulmonary edema and death. Kidney damage can occur. It is a severe skin irritant.

September 20, 1983.—One hundred pounds of chlorine were released to the atmosphere from a swim club due to equipment failure.

November 3, 1983.—An unknown amount of ammonia gas escaped to the air due to equipment failure. Eighty people were sheltered. If inhaled, ammonia can cause corrosion of the lungs, pulmonary edema and death. Human contact with the liquid or vapor can cause severe burns to the skin and eyes.

February 14, 1984.—Fifteen hundred pounds of chlorine were released to the environment at a wastewater treatment plant due to equipment failure. One person was injured.

May 18, 1984.—Unknown amounts of ammonia and carbon monoxide escaped to the atmosphere at a dairy farm due to unknown reasons. Three people were hospitalized.

October 6, 1984.—An estimated 1200 gallons of crude malathion were released into the atmosphere in the form of mist and vapor from a storage tank. The combination of higher than normal storage temperatures and cooling water entering the tank caused rapid thermal decomposition. Over 100 people were evacuated and 5 were admitted to hospitals. Malathion can cause nausea, vomiting, twitching and convulsions.

October 29 and 30, 1984.—Hydrogen sulfide and mercaptans escaped into the air as a result of failure of a flare system to burn gases that would normally be vented to the refinery's sulfur recovery unit. The release resulted in numerous citizen complaints in the area surrounding the refinery. Hydrogen sulfide in moderate concentrations is a highly poisonous gas causing respiratory paralysis.

November 9, 1984.—Sulfur trioxide vapor escaped from a pipe carrying liquid sulfur trioxide when an attempt was made to replace a valve at a chemical facility. Sulfur trioxide is the precursor of sulfuric acid. It dehydrates and burns skin, lungs, and other human tissues almost instantly on contact. The mist or vapor is extremely irritating to eyes, lungs and skin.

November 16, 1984.—Approximately 600 pounds of anhydrous hydrogen chloride were released to the atmosphere during a tank filling operation as a result of operator error.

November 27, 1984.—An unknown amount of oleum was released from a pump seal at a chemical manufacturing facility. Forty people reported to hospitals for treatment. Oleum fumes (SO_3) cause severe dehydration and burns that can be fatal.

November 29, 1984.—Approximately 25 gallons of monochloroacetone were released because a temperature controller failed which resulted in shut off of cooling water. Residents nearby complained of irritated and tearing eyes. Monochloroacetone is a severe irritant and is corrosive.

December 1, 1984.—Unknown amounts of butane and methyl mercaptan were believed to be released to the environment after the valve on a tank truck was broken off. Butane is extremely flammable and also causes dizziness and suffocation. Methyl mercaptan is a toxic, flammable, reactive gas.

January 4, 1985.—Fifty gallons of dimethyl phosphorochloridothionate (DMPCT) were released to the atmosphere from a major chemical manufacturing facility. The steam tracing of the storage tank caused overheating of the contents which resulted in overpressurization and rapid thermal decomposition. DMPCT is a severe skin and eye irritant and when inhaled is corrosive to mucous membrane which may lead to pulmonary edema.

January 15, 1985.—An estimated 2600 pounds of oleum was spilled resulting in 500 pounds of sulfur trioxide and sulfuric acid mist escaping to the air.

January 21, 1985.—An unknown amount of the Cygon 400 was released to the environment when steam entered the storage vessel causing rapid thermal decomposition. Cygon 400 is an insecticide and is no longer produced at the site. The substance can be absorbed through the skin, cause respiratory paralysis and death.

July 5, 1985.—Unknown amounts of hydrochloric acid and hydrofluoric acid were released in a spill. One person was hospitalized.

August 21, 1985.—An unknown amount of ammonia was released to the environment during a drum filling operation. Two people were hospitalized.

September 29, 1985.—An unknown amount of anhydrous ammonia was released to the air due to equipment failure. Ten people were hospitalized, fifty were evacuated, and 33 were injured. The release was caused by the failure of a gasket.

October 21, 22, 23 and 24, 1985.—Hydrogen sulfide and mercaptans were released to the air as a result of a process upset which overloaded a flare system at a refinery. Some of the hydrogen sulfide and mercaptans continued to be emitted for several days as a result of saturation of water in a knockout drum which flowed to the wastewater treatment system. Citizens in 12 of New Jersey's 21 counties were affected by the incident along with citizens in two neighboring states.

November 7, 1985.—An unknown amount of anhydrous ammonia escaped to the atomsphere and spilled due to equipment failure. Three people were hospitalized and one hundred were evacuated.

April 8, 1986.—An unknown amount of oleum was spilled at a chemical facility. A fuming drum created a 100 foot vapor cloud, and two people were injured.

May 13, 1986.—An unknown amount of vinyl chloride was released to the environment in an explosion and fire due to equipment failure. A leaking reactor

> resulted in the explosion. Five people were hospitalized, and there was one fatality. Burning vinyl chloride releases hydrogen chloride which can cause pulmonary edema and hemorrhage.
>
> *May 19, 1987.*—About half a ton of chlorine gas escaped the flow of chlorine from a tank car to the process. Three men in an adjancent parked car were overcome and hospitalized.

As a further illustration of the chemical accident problem from a State perspective, the State of New York has been making annual reports on the toll of chemical accidents. In 1986, New York experienced 672 toxic chemical releases, almost 2 per day. As the result of these events 5 people were killed and 133 injured. The Attorney General's office reports that more than 2,000 hazardous substances are used or stored at some 13,000 facilities across the State. Since 1983, the chemical accident toll is 26 killed, 378 injured and another 4,000 evacuated from their homes or workplaces as the result of chemical releases in that State alone.

In the aftermath of Bhopal, both the Occupational Safety and Health Administration and the Environmental Protection Agency have undertaken efforts to determine the nature and extent of the potential injury and damage which may result from the production and use of extremely hazardous substances. The OSHA program, called the Chemical Special Emphasis Program or ChemSEP, involved in-depth investigations at 40 plants including facilities from several industries and of several sizes. OSHA investigated the potential for releasing any one of just 10 chemicals at these 40 facilities. Despite this narrow scope, the average inspection took more than 340 hours (10 times the effort required for a typical health and safety inspection). Citations for unsafe conditions were made at 38 of the 40 plants; 128 of the citations were classified as in response to serious violations. Smaller and older facilities tended to have more violations.

The overwhelming impression one gains from a review of the OSHA ChemSEP report is that the safety and health regulations currently enforced by OSHA are not effective in reducing the risk of potentially catastrophic events. Quoting from the final ChemSEP report issued on March 11, 1987, OSHA says:

> The valuable lesson learned by OSHA from these ChemSEP inspections is that an inspection process different from the agency's traditional approach of determining compliance with safety and health standards is needed to address the identification and correction of potentially catastrophic situations. A comprehensive approach which includes both physical conditions and management systems is indicated. . . . The combination of a low volume of safety and health standards citations with frequent use of the Occupational Safety and Health Act's General Duty Clause and frequent resort to recommendations in lieu of citations raises questions about how the orientation of existing OSHA standards might relate to the prevention of potential chemical catastrophes. OSHA's standards applicable to conditions found in chemical operations were de-

> veloped to protect worker safety and health against common hazards, not rare catastrophic events. Reevaluation of the role of existing standards and consideration of an approach to require industry to conduct self-audits seems to be indicated . . . OSHA's regular health inspections in the chemical industry have focused on chronic exposures to hazardous substances. While this concern is sometimes appropriate, it is not germane to the problem of preventing catastrophic releases.

In June 1985, the Environmental Protection Agency announced a comprehensive air toxics strategy. One section of that strategy, the Chemical Emergency Preparedness Program (CEPP), was designed to address accidental releases of acutely toxic chemicals. The program had two goals: (1) to increase local community awareness of chemical hazards; and (2) to enhance State and local emergency planning for response to chemical accidents. By November of 1985, EPA had developed criteria for identifying acutely toxic chemicals and a list of 402 such substances. The list was published along with a guidance document on organizing community-based emergency preparedness programs. The general structure of CEPP and the list of acutely toxic chemicals were incorporated by the Congress in the Emergency Planning and Community Right-to-Know Act which was signed into law (as title III of the Superfund Amendments and Reauthorization Act) in October of 1986.

Title III has four major objectives: (1) emergency planning; (2) emergency notification; (3) community right-to-know; and (4) the development of an emissions inventory. In addition, Title III contains general provisions on trade secrets and enforcement.

Title III requires the Governor of each State to designate a State emergency planning commission not later than April 17, 1987. The State commissions include the public safety and environmental protection agencies of State government and other parties. The State commissions are to designate local emergency planning districts and appoint local emergency planning committees. The State commissions also have a role in reviewing local emergency response plans once they are developed.

The local emergency response committees are broadly representative of the public safety and environmental protection interests found in every community: elected officials; police, fire and civil defense authorities; public health professionals; environmental and transportation officials; community groups; and the media. The principal duty of these local committees is to develop an emergency response plan for the planning district.

Each facility handling one of the extremely hazardous substances listed pursuant to Title III (the same substances which were listed as acutely toxic substances under CEPP) must notify the local emergency planning committee and designate an officer or employee of the facility to work with the committee in preparation of the plan.

Each local planning district must have developed an emergency response plan not later than October 17, 1988. These plans are to include: (1) identification of facilities handling and routes used in the transportation of extremely hazardous substances; (2) emergency response procedures at these facilities and in the community; (3) designation of a community coordinator and a facility coordinator to implement the plan; (4) emergency notification procedures; (5) methods for detecting the occurrence of a release and the potentially affected area and population; (6) description of community and industrial emergency equipment and facilities; (7) evacuation plans; (8) schedules of training programs; and (9) methods for carrying out emergency response plans.

Each facility which experiences an accidental release of an acutely toxic chemical listed under title III in amounts greater than the "reportable quantity" must immediately notify the State and local emergency response commissions. The notification requirement also applies to the release of any hazardous substance listed pursuant to section 103 of the Superfund law.

These notifications must include the name of the chemical released; an estimate of the quantity released; adverse health effects that might be associated with exposure to the substance; and the precautions, including evacuation, that should be taken.

A written follow-up notification to the emergency planning authorities is also required after a release occurs.

There are two community right-to-know reporting requirements in title III. The first provides that each facility which must prepare or have available a Material Safety Data Sheets (MSDS) as required by OSHA, will submit the actual MSDS (or in the alternative a list of MSDS's) to the emergency planning commission. An MSDS describes the physical and chemical properties of a particular substance, the adverse health effects which may be associated with exposure to the substance, and the medical attention that is appropriate in the event of exposure. Only facilities in Standard Industrial Classification codes 20–39 (manufacturing and importers) are subject to this requirement. If only a list is submitted, the actual MSDS's must be supplied upon request to the local planning commission.

The second requirement provides for the submission of a quantitative inventory of the extremely hazardous substances present at each facility. The inventory requirement takes a two-tier approach. So-called Tier I information is mandatory and must be submitted by March 1, 1988. Tier II information only need be supplied, if specifically requested by the local authorities. Tier I information includes: estimates of chemical quantities present at the facility in ranges and for categories (rather than by name); average daily inventories; and the general location of the chemicals. Tier II information which may be requested by local authorities includes: the actual chemical names; maximum amounts present at any one time; manner of storage; specific location at the facility; and any trade secret claims the owner or operator wishes to assert with respect to the Tier II information.

The final major provision of title III (section 313) requires facilities handling significant quantities of any one of 329 chemical substances (not extremely hazardous substances, but those on a separate list including chemicals produced and used in large volumes which are routinely released) to report total emissions of that substance to EPA and the State in which the facility is located. The first report on emissions (for facilities handling more than 10,000 pounds or manufacturing more than 75,000 pounds of any substance on the list) is due on July 1, 1988. Only facilities in SIC codes 20–39 are subject to the reporting requirement and firms with less than 10 employees are exempt. The purpose of this section is not to provide a data base for emergency planning (the chemicals are routinely released), but to establish national and State emissions inventories of toxic air pollutants.

In addition to establishing emergency planning and community right-to-know programs, title III contains several miscellaneous provisions, one of which (section 305(b)) requires EPA to conduct a national study to review systems for monitoring, detecting and preventing releases of extremely hazardous substances at a representative sample of facilities which produce, use or store these substances. The study is also to consider the technology for public alert systems. EPA is to submit its final report to the Congress not later than April 17, 1988, but an interim report describing the study design and preliminary results from a literature review was transmitted to the Congress in May of 1987. EPA has selected 20 of the extremely hazardous substances listed pursuant to title III as the base for this "Review of Emergency Systems" study. It will send a questionnaire to an unspecified number of facilities handling these substances to gather information on their monitoring, detection and prevention systems and, based on the questionnaire results, may visit specific facilities for on-site investigations.

In addition to the programs actually mandated by the Emergency Planning and Community Right-to-Know Act of 1986 (title III of SARA), the Environmental Protection Agency has initiated a small pilot program on chemical accidents which it calls the Accident Release Information Program (ARIP). Essentially, the Agency has sent a 36-question survey instrument to 9 chemical facilities (located in one EPA region) which have experienced very large accidental releases (an order of magnitude larger than the reportable quantity under CERCLA) of extremely hazardous substances. All 9 of the companies completed and returned the questionnaire.

Although the Agency points to this program as part of its effort to respond to chemical accidents, very little can be gleaned from reviewing the data produced. Only 9 facilities were queried, whereas accidents have happened at thousands of sites across the Nation. Nevertheless, EPA tells us that: most of the facilities were more than 30 years old; one-third of the releases moved off-site; inspections had not previously uncovered potential hazards; all 9 companies had taken some action (before they received the EPA letter, not in response to it) to correct the problems which had caused the accidental release.

Whether the Agency will continue this program, conduct it as a statistically valid survey effort, share the gathered information with the public and other entities in the chemical industry, or act to correct problems consistently reported (through anticipatory regulations) is unclear at this time. That the Agency would point to this modest information gathering exercise conducted through the mail as a major part of its accident prevention initiative (as the Administrator did in testimony before the Committee on July 22, 1987) is some measure of the actual hostility the Agency bears toward an effective Federal role in the prevention of chemical accidents. It is a surprisingly small effort. By way of comparison, OSHA conducted 40 on-site investigations averaging 340 hours each as part of its pilot ChemSEP program.

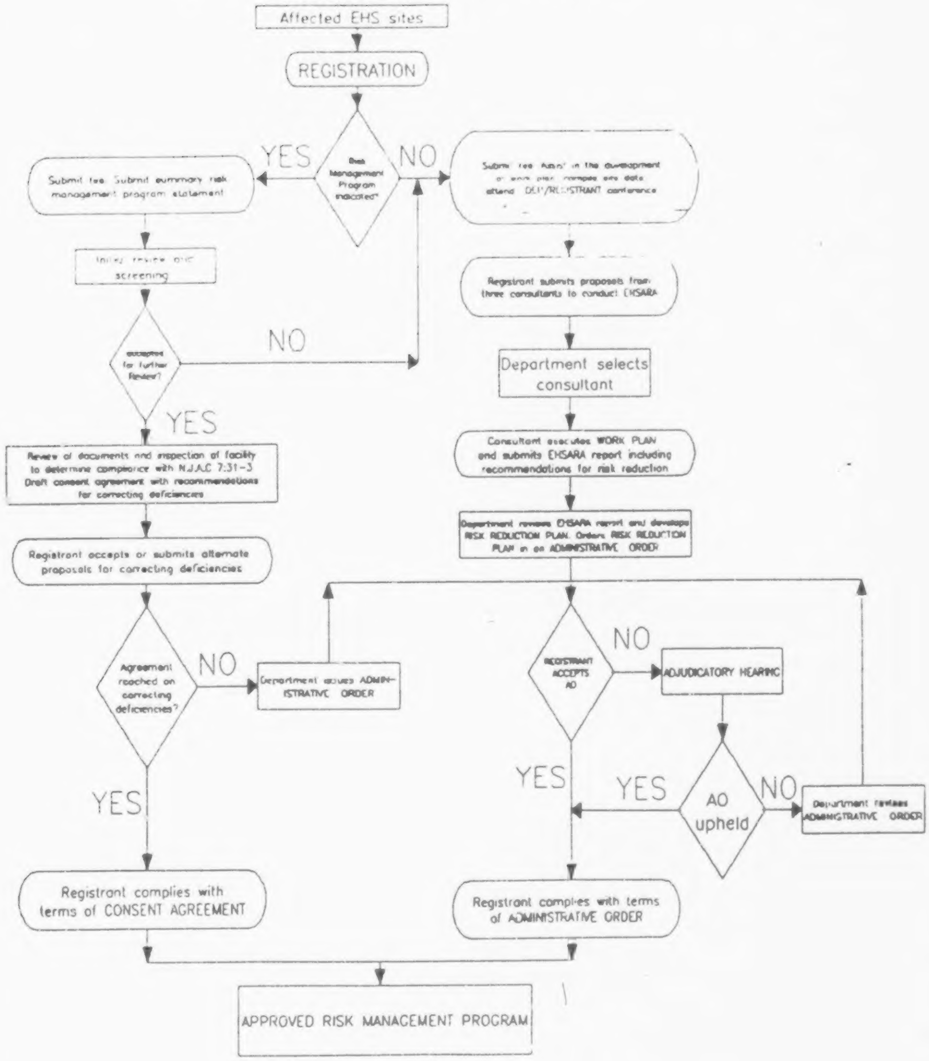
A few States, most prominently New Jersey and California, have taken a more aggressive posture. Perhaps the most innovative and promising response worldwide to the chemical accident problem is the Toxic Catastrophe Prevention Act (TCPA) which became law in New Jersey in January of 1986. TCPA applies to each New Jersey facility which handles any one of 104 extremely hazardous substances in more than threshold amounts. Each such facility must complete a registration form which includes an inventory of all extremely hazardous substances present at the site; a description of the processes and equipment at the facility; a profile of the area and community in which the facility is located; a description of the formal hazard assessments which have been conducted; and the names of the facility's insurance carriers.

A risk management program is to be developed for each facility. These programs include safety reviews of process design and equipment; standard operating procedures; preventive maintenance; operator training; accident investigation; risk assessment; emergency response plans; and audits to assure that plans and requirements are being implemented. Facilities having a risk management program are to submit them for review and proposed modification by the New Jersey Department of Environmental Protection.

Facilities without existing risk management programs are to conduct a formal hazard assessment. Based on the assessment, DEP and the owner or operator of the facility will jointly develop a risk reduction work plan. TCPA gives the State agency the power to issue orders requiring implementation of the work plan and steps to reduce the risk of catastrophic releases on a plant-by-plant basis. A flow chart of the New Jersey program is included as Figure V. 7.

FIGURE V. 7.

FIG. V-1 FLOW CHART OF FRAMEWORK OF THE PROPOSED REGULATIONS


Affected EHS sites
REGISTRATION
Risk Management Program indicated?
YES
NO
Submit fee. Submit summary risk management program statement
Submit fee. Assist in the development of work plan, compile site data, attend DEP/REGISTRANT conference
Initial review and screening
accepted for further Review?
NO
YES
Registrant submits proposals from three consultants to conduct EHSARA
Department selects consultant
Consultant executes WORK PLAN and submits EHSARA report including recommendations for risk reduction
Review of documents and inspection of facility to determine compliance with N.J.A.C. 7:31-3 Draft consent agreement with recommendations for correcting deficiencies
Department reviews EHSARA report and develops RISK REDUCTION PLAN. Orders RISK REDUCTION PLAN in an ADMINISTRATIVE ORDER
Registrant accepts or submits alternate proposals for correcting deficiencies
Agreement reached on correcting deficiencies?
NO
Department issues ADMINISTRATIVE ORDER
REGISTRANT ACCEPTS AO
NO
ADJUDICATORY HEARING
YES
YES
AO upheld
NO
Department revises ADMINISTRATIVE ORDER
YES
Registrant complies with terms of CONSENT AGREEMENT
Registrant complies with terms of ADMINISTRATIVE ORDER
APPROVED RISK MANAGEMENT PROGRAM

The State of California has also adopted a chemical accident prevention statute (AB 3777). Each business handling an acutely hazardous material (the list of substances prepared by EPA under CEPP) must file a registration form and submit an inventory of substances on site. The locality in which the business operates may request preparation of a "risk management prevention plan" which will include: a description of any accidental release occurring over the past 3 years; a report on the equipment at the site, its condition and maintenance; an analysis of potential off-site consequences of a release; a description of steps that will be taken to reduce risk; the installation of alarms and monitoring devices; and audit, inspection and record-keeping programs. The "risk management prevention plan" must be submitted to the local government for approval. The local government has the right to enter and inspect the facility and may require that all of the necessary risk reduction measures (including modifications to equipment and operations) be taken before operations at the facility commence.

New Jersey and California are not alone in taking steps to reduce the risk of serious chemical accidents. As the result of events in Flixborough, England, in 1974 (an explosion which killed 29) and Seveso, Italy, in 1976 (a non-fatal accident which nevertheless contaminated several square miles of the Italian countryside with dioxin), the European Community adopted the so-called "Seveso" Directive in 1982. Its basic features include:

(1) a general duty placed on member nations to adopt regulations to ensure that industrial firms take measures to prevent major accidents and to limit their environmental and public health consequences;

(2) a general duty placed on chemical companies to prove to appropriate government officials that they have identified major hazards, adopted appropriate safety measures, and provided employees with information, training and equipment needed to ensure their safety;

(3) a requirement that companies notify government authorities, if their activity involves any of a list of 178 dangerous substances, including information on the substances, the facilities, and possible major accident hazards, and on-site emergency plans;

(4) a requirement that member nations appoint authorities to receive and examine the information from the companies, and draw up off-site emergency plans;

(5) a requirement that industrial firms take the most appropriate measures to prevent accidents, to limit their consequences, and to conduct inspections;

(6) a requirement that governments make available to persons likely to be affected by an accident information on safety measures and on emergency response measures, and make the same information available to other governments;

(7) a requirement that a company experiencing a major accident notify the authorities and provide information on the accident (after which the government must notify the European Community for dissemination of information on the accident and any potential hazard to other nations); and

(8) trade secret protection for confidential information.

Based on the above review of the record with respect to chemical accidents and the measures that various Federal agencies, States and other nations are taking to respond to chemical accidents, several conclusions are warranted:

I. Sudden, catastrophic events that result in the release of extremely hazardous substances are a significant (and perhaps, increasing) threat to public health and safety in the United States.

II. The United States Government (acting through EPA and OSHA) is currently supporting some efforts in the areas of local emergency planning and community right-to-know which are useful and may provide a modest information base for further action to reduce the potential for catastrophic events.

III. Emergency planning and preparedness is an essential aspect of a total response to this threat. However, accident prevention also has great promise, but is not given sufficient attention in current Federal programs.

IV. Some European nations and American States have developed innovative and aggressive accident prevention and risk reduction programs that could serve as models for new, national efforts.

V. Given the technical complexity and economic importance of modern industrial chemical utilization, it is appropriate that Federal agencies play a leading role in accident prevention and mitigation. However, no agency of the United States Government is actively engaged in efforts to prevent chemical accidents.

VI. Modest additional steps beyond emergency planning and community right-to-know are now appropriate and, if implemented with existing programs in a coordinated manner, may offer significant enhancement of public health and safety at minimal national cost.

Based on these conclusions the reported legislation adds a new subsection (g) to section 112 of the Clean Air Act which will: 1) establish a short list of extremely hazardous substances for priority attention; 2) require each facility handling such substances to prepare a hazard assessment; 3) create an independent chemical safety board to investigate accidents and recommend measures to reduce the risk of catastrophic events; 4) authorize the Environmental Protection Agency to issue rules to prevent, detect and correct accidental releases of extremely hazardous substances; 5) authorize the Agency to issue orders to correct site-specific situations which may endanger public health or the environment through release of an extremely hazardous substance; and 6) establish accident prevention and mitigation as a general duty of those who own and operate facilities handling extremely hazardous substances.

DEFINITIONS

SUMMARY

The reported bill amends subsection (a) of section 112 of the Clean Air Act to add definitions for the terms "major source" and "area source" and modify the definition of "stationary source" found in current law.

DISCUSSION

Under provisions of the bill, major sources of 224 air pollutants will be subject to emissions standards developed by the Administrator which reflect the degree of control that can be accomplished through application of the best available control technology. The concept of "major source" is not used in the current regulatory regime for hazardous air pollutants and, thus, a definition of "major source" needs to be added to this section. The definition established here will only apply in the context of section 112 and should not be confused with other meanings of the term "major source" in parts C (prevention of significant deterioration) or D (non-attainment) of the Act.

Major sources are stationary sources of the 224 pollutants listed pursuant to the new subsection (b) (or other pollutants subsequently added to the list) which meet either one of two tests. If the source emits (or has the potential, absent control, to emit) 5 tons per year of any one of the 224 pollutants, it is a major source. A facility will also be considered a major source, if it emits (or has the potential, absent control, to emit) any combination of the pollutants on the list in an amount equal to or exceeding 25 tons per year. Regulations implementing the provisions of the new subsection (b) are to define major sources such that sources which would emit more than the threshold amounts (5 or 25 tons per year) when uncontrolled (whether or not controls are in place) will be subject to the emissions standards.

The Administrator may establish quantities less than 5 tons per year for one pollutant or 25 tons per year for any combination, if the toxicity (potency) of the pollutant or pollutants or other non-economic factors (human exposure, concentration of sources, additive or synergistic effects, environmental damage or other factors) would indicate that a lower threshold is appropriate. The authority to set lower thresholds as part of the "major source" definition may be especially useful in the control of particulate emissions, including metals from some source categories.

The definition of "major source" also includes provisions to assure that stationary sources which would otherwise be subject to the emissions standards, are not excluded from control requirements as the result of arbitrary subdivision or description. A stationary source potentially subject to an emission standard because it emits a listed air pollutant is to be defined to include "all emission points and units of such source located within a contiguous area and under common control." This language will prevent a facility from avoiding control by subdividing its operations into separate emissions points, product lines or units at one site with individual emissions rates less than the 5 or 25 ton per year thresholds.

Section 501 of title V also includes a new definition for the term "area source." Area sources are the small, diverse facilities and activities which routinely release toxic air pollutants and may include items like wood stoves, service stations, dry cleaners, and automobiles, trucks, and buses. The bill directs the Administrator to reduce total emissions from area sources by 55 percent over a 10-year period. An area source may be either a stationary source or a mobile source of one or more of the 224 pollutants listed pursuant to the new subsection (b) (or other pollutant subsequently added to the list).

Area sources will also include facilites of a type or types which are included among the major sources. Although of the same kind, these facilities are area sources rather than major sources because their emissions potential is less than 5 tons per year of a listed pollutant. For instance, industrial dry cleaning operations will be listed as a major source category because some of these operations emit the solvent perchloroethylene, which is one of the 224 listed substances, in amounts greater than 5 tons per year. Small dry cleaners emitting lesser amounts of perchloroethylene would be among the area sources as defined in the bill. In the same way, small chemical processing or handling facilities, petroleum facilities and other stationary sources are defined as area sources even though other facilities of the same kind reach major source status. All sources of the listed pollutants shall be classified either as major or area sources.

The inclusion of mobile sources under the definition of areas sources, and the possible delegation of section 112 implementation and enforcement authorities to State and local pollution control agencies under subsection (e), does not in any way authorize the regulation of mobile source emissions by State or local agencies, if that regulation would be prohibited by other provisions of the Act.

Section 501 also modifies the definition of "stationary source" as used in current law. A stationary source is defined to include any particular unit of a facility or installation (with the capacity to emit 5 tons of a listed pollutant per year) in addition to the facility or installation itself. This modification is intended to prevent "bubbling" within facilities and installations which might otherwise be used to facilities and installations which might otherwise be used to satisfy emissions standards which may be promulgated for some, but not all units, of a facility or installation under section 112. To the extent that an emissions standard is established under either subsection (b) or (c) for a unit at a facility or installation which may also emit the pollutant from other units or parts of the operation not subject to a standard (or subject to a different standard), emissions reductions at the uncontrolled (or otherwise controlled) unit shall not be considered in determining compliance with the standard or standards.

As used in this section, the term "environment" encompasses all of the values referred to in the definition by these amendmentss.

Definitions established in current law for "hazardous air pollutant," "new source," "modification," "owner or operator," and "existing source" remain in the Act unchanged by this legislation.

TECHNOLOGY-BASED STANDARDS

SUMMARY

The bill adds a new subsection (b) to section 112 of the Clean Air Act to: (1) provide authority for the Administrator to promulgate emissions standards for major sources of listed air pollutants based on the level of control which can be achieved through application of the best available control technology; and (2) establish as an objective of the programs conducted under the Clean Air Act and other authorities of the Agency of reduction of 55 percent in the inventory of emissions from the small, diverse area sources of air toxics over a 10-year period.

The sources of air pollutants which are subject to the requirements of the new subsection (b) are those which emit any one of the air pollutants on a list established pursuant to this subsection by the Administrator. An initial list of 224 substances is established by statute. The Administrator is given authority to add or delete substances from the list.

The Administrator is also to publish a list of the categories or subcategories of major sources of each of these 224 pollutants. For each source category or subcategory, the Administrator is to establish emissions standards which will reduce emissions of the listed pollutants to the maximum extent achievable using best available control technology, taking into account the cost of achieving such reduction and other factors. A phased schedule for the promulgation of these "technology-based" emissions standards for major sources is included and provides that all standards will be issued and have an effective date within 10 years of enactement of this legislation.

The standards for major sources issued under the authority of this new subsection may include leak detection requirements to protect human health and the environment and may require the owner or operator of facilities emitting listed substances to conduct leak prevention and safety audits annually.

In addition to the control of emissions from major sources, this new subsection also establishes goals and objectives for a program to reduce emissions from the so-called "area sources" of the listed air pollutants. The objective is a nationwide 55 percent reduction from 1988 levels to be accomplished in a phased program over a 10-year period using authorities granted the Administrator under section 112, other sections of the Clean Air Act and other statutes. The Administrator is to list categories of area sources, develop a 1988 emissions inventory for such sources, and report to the Congress periodically on measures taken to meet the objective.

DISCUSSION

Title V is intended to accelerate the regulation of toxic air pollutants by creating a program of technology-based standards similar to those which have already been implemented under the Clean Water Act for control of toxic effluent discharged to surface waters from major industrial sources. The legislation will establish emission standards for the major sources of a list of air pollutants carefuly screened to include only those items previously deemed harmful by the Congress, the Environmental Protection Agency, other Federal agenies or the States.

By establishing in the statute an initial list of chemicals to be regulated and requiring that the standards be based on already demonstrated technology, the bill forces regulatory action to overcome the inertia which has plagued the health-based standard-setting process authorized by current law. The reported bill creates a strong presumption to regulate a very large class of air pollutants, mitigated to some extent (for those uncomfortable with congressionally-mandated lists) by a less stringent regulatory regime than is mandated by under current law. Paragraph (1) of the new subsection (b) establishes a nondiscretionary duty of the Administrator (subject to citizen suit under section 304 of the Act) to promulgate technology-based emissions standards for all categories ans subcategories of major emitting sources of 224 listed air pollutants.

The air pollutants subject to regulation under the provisions of subsection (b) are (initially) 224 substances listed in Part A of Committee Print 100-55 published by the Committee on Environment and Public Works of the United States Senate and entitled, "Air Pollutants Subject to Section 112(b) of the Clean Air Act." These pollutants are also listed in Figure V. 8. of this report. The Administrator is authorized to add or delete substances from this initial list.

FIGURE V. 8.

This list may be revised from time to time by the Administrator of the Environmental Protection Agency consistent with the provisions of the Clean Air Act.

PART A—AIR POLLUTANTS SUBJECT TO SECTION 112(b) OF THE CLEAN AIR ACT

CAS number	Substance
75-07-0	Acetaldehyde
60-35-5	Acetamide
67-64-1	Acetone
75-05-8	Acetonitrile
53-96-3	2-Acetylaminofluorene (N-9H-fluoren-2-YL-acetamide)
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
309-00-2	Aldrin
107-05-1	Allyl chloride
7429-90-5	Aluminum (fume or dust)
92-67-1	4-Aminobiphenyl
7664-41-7	Ammonia
62-53-3	Aniline
90-04-0	o-Anisidine
104-94-9	P-Anisidine
7440-36-0	Antimony (and compounds)
7440-38-2	Arsenic (and compounds)
1332-21-4	Asbestos (friable)
492-80-8	Auramine
7440-39-3	Barium (and compounds)
71-43-2	Benzene
92-87-5	Benzidine
50-32-8	Benzo[a]pyrene
98-07-7	Benzoic trichloride (Benzotrichloride)
94-36-0	Benzoyl peroxide
100-44-7	Benzyl chloride
7440-41-7	Berryllium (and compounds)
92-52-4	Biphenyl (Diphenyl)
111-44-4	Bis (2-chloroethyl) ether (2,2'-Dichloroethyl ether)
75-25-2	Bromoform (Tribromomethane)
74-83-9	Bromomethane (Methyl bromide)
106-99-0	1,3-Butadiene
141-32-2	Butyl acrylate
71-36-3	n-Butyl alcohol (1-Butanol)
78-92-2	sec-Butyl alcohol
85-68-7	Butyl benzyl phthalate
123-72-8	Butyraldehyde
7440-43-9	Cadmium (and compounds)
156-62-7	Calcium cyanamide
133-06-2	Captan
63-25-2	Carbaryl
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
120-80-9	Catechol (Pyrocatechol)
133-90-4	Chloramben
57-74-9	Chlordane
76-13-1	Chlorinated fluorocarbon (Freon 113)
7782-50-5	Chlorine
10049-04-4	Chlorine dioxide
79-11-8	Chloroacetic acid (Assistacetic acid)
532-27-4	2-Chloroaceto phenone (a-Chloroacetophenone)
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate (Ethyl 4-4'-dichlorobenzilate
75-00-3	Chloroethane (Ethyl chloride)
67-66-3	Chloroform
74-87-3	Chloromethane (Methyl chloride)
542-88-1	Chloromethyl ether
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
7440-47-3	Chromium (and compounds)
7440-48-4	Cobalt (and compounds)
7440-50-8	Copper (and compounds)
1319-77-3	Cresol (mixed isomers)
108-39-4	m-Cresol
95-48-7	o-Cresol (o-Cresyl acid)
106-44-5	p-Cresol
98-82-8	Cumene (1-Methylbenzene)
57-12-5	Cynanide compounds
110-82-7	Cyclohexane (Hexahydrobenzene)
94-75-7	2,4-D ((2,4-Dichlorophenoxy)Acetic acid)
72-55-9	DDE
25376-45-8	Diaminotoluene (mixed isomers)
95-80-7	2,4-Diaminotoluene
119-90-4	o-Dianisidine (3,3'-Dimethoxybenzidene)
334-88-3	Diazomethane
132-64-9	Dibenzofuran
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)
106-93-4	1,2-Dibromoethane (Ethylene dibromide)
84-74-2	Dibutyl phthalate
25321-22-6	Dichlorobenzene (mixed isomers)
95-50-1	1,2-Dichlorobenzene (o-Dichlorobenzene)
106-46-7	1,4-Dichlorobenzene (p-Dichlorobenzene)
91-94-1	3,3'-Dichlorobenzidine
75-71-8	Dichlorofluoromethane
75-34-3	1,1-Dichloroethane
107-06-2	1,2-Dichloroethane (Ethylene dichloride)
540-59-0	1,2-Dichloroethylene (Acetylene dichloride)
75-09-2	Dichloromethane (Methylene chloride)
78-87-5	1,2-Dichloropropane
542-75-6	1,3-Dichloropropylene (1,3-Dichloropropene)

PART A—AIR POLLUTANTS SUBJECT TO SECTION 112(b) OF THE CLEAN AIR ACT—Continued

CAS number	Substance
62-73-7	Dichlorvos
115-32-2	Dicofol (Kelthane)
60-57-1	Dieldrin
111-42-2	Diethanolamine
117-81-7	Di(2-Ethylhexyl)phthalate (DEHP)
84-66-2	Diethyl phthlate (1,2-Diethyl ester 1,2-benzene dicarboxy)
64-67-5	Diethyl sulfate
60-11-7	4-Dimethylaminoazobenzene (p-Dimethylaminoazobenzene)
121-69-7	N,N-Dimethylaniline
119-93-7	3,3′-Dimethylbenzidine (o-Tolidine)
79-44-7	Dimethylcarbamyl chloride
57-14-7	1,1-Dimethyl hydrazine (Dimethylhydrazine)
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfate
534-52-1	4,6-Dinitro-o-cresol (Dinitrocresol)
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene (1-Methyl-2, 4-Dinitrobenzene)
123-91-1	1,4-Dioxane (1,4-Diethylene dioxide)
122-66-7	1,2-Diphenyl hydrazine (Hydrazobenzene)
106-89-8	Epichlorohydrin
110-80-5	2-Ethoxyethanol
140-88-5	Ethyl acrylate
100-41-4	Ethyl benzene
74-85-1	Ethylene
107-21-1	Ethylene glycol
151-56-4	Ethyleneimine (Azindine)
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
50-00-0	Formaldehyde
76-44-8	Heptachlor
118-74-1	Hexachlorobenzene
87-68-3	Hexachloro-1,3-butadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
1335-87-1	Hexachloronaphthalene
680-31-9	Hexamethylphosphoramide
302-01-2	Hydrazine
7647-01-1	Hydrochloric acid (Hydrogen chloride (gas only))
74-90-8	Hydrogen cyanide (Hydrocyanic acid)
7664-39-3	Hydrogen fluoride
123-31-9	Hydroquinone
78-59-1	Isophorone
67-63-0	Isopropyl alcohol (Mfg.-strong acid processes)
7439-92-1	Lead (and compounds)
58-89-9	Lindane (Hexachlorocyclohexane)
108-31-6	Maleic acid anhydride (2,5-Furandione)
7439-96-5	Manganese (and compounds)
51-75-2	Mechlorethamine (Nitrogen mustard)
108-78-1	Melamine
7439-97-6	Mercury (and compounds)
67-56-1	Methanol
72-43-5	Methoxychlor (1,1,1-Trichloro-2,2-Bis (P-Methoxyphenyl) ethyl)
109-86-4	2-Methoxyethanol (Methyl cellosolve)
96-33-3	Methyl acrylate
101-14-4	4,4′-Methylene bis(2-Chloroaniline) (MOCA)
101-68-8	Methylene bis(Phenylisocyanate) (MBI)
101-77-9	4,4′-Methylene dianiline (p,p′-diaminodiphenylmethane)
78-93-3	Methyl ethyl ketone (MEK) (2-Butanone)
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide (Iodomethane)
108-10-1	Methyl isobutyl ketone (MIBK) (Isopropylacetone) (Hexone)
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
91-20-3	Naphthalene
134-32-7	alpha-Naphthylamine
91-59-8	beta-Naphthylamine (2-Naphthylamine)
7440-02-0	Nickel (and compounds)
7697-37-2	Nitric acid
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl
1836-75-5	Nitrofen
55-63-0	Nitroglycerin
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
62-75-9	N-Nitrosodimethylamine
684-93-5	N-Nitroso-N-methylurea (N-methyl-N-nitrosocarbamide)
59-89-2	N-Nitrosomorpholine
2234-13-1	Octachloronaphthalene
20816-12-0	Osmium tetroxide
56-38-2	Parathion
87-86-5	Pentachlorophenol (PCP)
108-95-2	Phenol
106-50-3	p-Phenylenediamine
75-44-5	Phosgene
7664-38-2	Phosphoric acid
7723-14-0	Phosphorus (yellow or white)
85-44-9	Phthalic anhydride (1,2 Benzene dicarboxylac acid anhydride)
88-89-1	Picric acid
1336-36-3	Polychlorinated biphenyls (PCBs)
1120-71-4	Propane sultone (2,2-dioxide 1,2-oxathiolane)
57-57-8	beta-Propiolactone
114-26-1	Propoxur
75-55-8	Propyleneimine
75-56-9	Propylene oxide
110-86-1	Pyridine
91-22-5	Quinoline
106-51-4	Quinone (p-Benzoquinone)
82-68-8	Quinotozene (Pentachloronitrobenzene)
7782-49-2	Selenium
7440-22-4	Silver (and compounds)
1310-73-2	Sodium hydroxide (solution)
100-42-5	Styrene (monomer)
96-09-3	Styrene oxide
7664-93-9	Sulfuric acid
100-21-0	Terephthalic acid
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethylene (Perchloroethylene)
7440-28-0	Thallium (and compounds)
13463-67-7	Titanium dioxide

PART A—AIR POLLUTANTS SUBJECT TO SECTION 112(b) OF THE CLEAN AIR ACT—Continued

CAS number	Substance
108-88-3	Toluene (Methyl benzene)
584-84-9	Toluene-2,4-Diisocyanate
95-53-4	o-Toluidine
8001-35-2	Toxaphene (Camphechlor)
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene (Trichloroethene)
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
1582-09-8	Trifluralin
51-79-6	Urethane (monomer) (Ethyl ester carbamic acid)
7440-62-2	Vanadium (fume or dust)
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride (monomer) (Chloroethane)
75-35-4	Vinylidine chloride (1,1-Dichloroethylene)
1330-20-7	Xylene (mixed isomers) (Dimethyl benzene)
108-38-3	m-Xylene (m-Dimethyl benzene)
95-47-6	o-Xylene (o-Dimethyl benzene)
106-42-3	p-Xylene (p-Dimethyl benzene)
7440-66-6	Zinc (fume or dust) (and compounds)

The 224 pollutants on the list were selected from the conjunction of three other lists: (1) those substances listed pursuant to section 313 of the Superfund Amendments and Reauthorization Act of 1986 (SARA); (2) those substances listed as high-priority environmental contaminants by the Agency for Toxic Substances and Disease (ATSDR) pursuant to section 104(i) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); and (3) those air pollutants for which at least one State or local air pollution control agency has established an "acceptable ambient concentration" or standard as noted in the National Air Toxics Information Clearinghouse data base for July, 1986.

In the community right-to-know provisions of the 1986 Superfund amendments the Congress required major facilities which manufacture, process or handle potentially harmful substances to report on their activities and emissions of pollutants to the environment. Section 313 of SARA creates a list of 329 chemical substances (20 of which are categories of chemcials) and requires the owners and operators of the facilities handling substantial quantities of these substances to begin reporting emissions data for the release of each substance to all media (some of the substances are not air pollutants, but are released to water or soil) beginning in July of 1988. The substances on this list reflect the combination of all substances listed by two State right-to-know programs, the New Jersey Industrial Survey and the Maryland Toxic Substances Registry.

The Agency commissioned ICF Incorporated to analyze these two State programs and in a memorandum dated October 16, 1986, ICF reported on the criteria used by these States to select substances for listing. The State of New Jersey used two criteria: 1) volume, that is significant rate of use, production or importation into New Jersey or the United States; and 2) evidence of at least one of the following health or environmental effects—carcinogenicity, teratogenicity, mutagenicity, other chronic effects, acute toxicity, persistence or ability to bioaccumulate. The State of Maryland used the following criteria: (1) the substance is listed by the National Toxicology Program as a known or anticipated human carcingogen; (2) the substance is classified as a carcinogen by the International Agency for Research on Cancer, the National Cancer Institute, or the Occupational Safety and Health Administration; (3) the substance is listed pursuant to the Clean Water Act as a toxic pollutant; (4) the substance is regulated under the Safe Drinking Water Act; (5) the substance is regulated under section 112 of the Clean Air Act; (6) the substance is designated as hazardous substance under Maryland law; or (7) the substance has a threshold limit value (TLV) (a workplace air quality stardard established by the American Conference of Governmental Industrial Hygienists) of less than 50 parts per million.

The ICF summary of the resultant list states:

> 48 percent of the NJ/MD chemicals are known, suspect or probable human and/or animal carcinogens and an additional 5 percent are possible human carcinogens. Of these carcinogens, 68 percent are also mutagens, 26 percent are acute toxicants, and 25 percent are chronic toxicants. Regulation by Federal agencies is a common characteristic of the NJ/MD carcinogens: 78 percent of the carcinogens are regulated by EPA, 49 percent by DOT and 43 percent by OSHA.
>
> Of the remaining noncarcinogens, 63 percent exhibit acute toxicity and 53 percent exhibit chronic toxicity. 34 percent of the noncarcinogens are mutagens. Regulation by a Federal agency is also a common characteristic of the NJ/MD noncarcinogens: 94 percent of the noncarcinogenic chemicals are regulated by EPA, 71 percent by DOT, and 57 percent by OSHA.

Although this analysis makes clear that the chemicals on the section 313 list are appropriately of high concern from a general health and safety prsepctive, there are many serious air pollutants which are not on the list established by section 313 of SARA. In particlar, dixoins, dibenzofurans and other products of combustion are not listed. Therefore, the Committee also incorporated a second list of initial pollutants. This second list has been prepared by the Federal Agency for Toxic Substances and Disease Registry (ATSDR) in response to the mandate in section 104(i) of CERCLA. It contains the 100 hazardous substances:

> . . . which are commonly found at facilities on the CERCLA National Priorities List and which . . . are posing the most significant potential threat to human health due to their known or suspected toxicity to humans and the potential for human exposure . . . (CERCLA), section 104(i))

This list of 100 substances (which is to be expanded in the future) was published in the Federal Register on April 17, 1987. Not all of the substances are air pollutants. 78 of the substances are already on the section 313 list: 22 are not. The 22 new substances are added to the 329 substances on the section 313 list to produce a total of 351 substances (of which 20 are categories of chemicals).

Because not all of the substances identified by New Jersey/Maryland or ATSDR are air pollutants, a further screening of the combined list of 351 substances was conducted to assure that the initial list for technology-based standards under subsection (b) would include only high-priority air pollutants. The Environmental Protection Agency maintains, in cooperation with the air pollution control agencies of State government, an air toxics clearinghouse to gather and disseminate technical information on toxic air pollutants. The data base for the clearinghouse (NATICH, July, 1986) maintains a file of the air pollutants for which at least one State has established an "acceptable ambient concentration". An acceptable ambient concentration is not generally an enforceable standard, but rather is guidance to be used by a State agency in the promulgation of a permit for a facility emitting that pollutant. States typically develop these acceptable concentration limits by translating workplace air quality standards into guidelines for the ambient environment. Workplace standards are usually set at a level which allows workers to be continuously exposed for 8 hours per day, 5 days per week without ill effect. These standards (set by government agencies and industrial councils) are adjusted to reflect the additional protection required for continuous exposure in the ambient environment and for the susceptability of sensitive populations.

States have established acceptable concentraion limits for 708 toxic air pollutants according to the 1986 NATICH data base. 223 of these pollutants are also on the list of 351 substances which reflect the conjunction of the section 313 and section 104(i) lists. While the existence of "acceptable ambient concentrations" set by individual States gives support to the listing of these substances for technology-based standards, reference to these State regulatory tools is not to imply that the actual numerical levels established by any State or the general methodology used by the States to set "acceptable ambient concentrations" would be appropriate under section 112. Federal emissions standards must be set according to the criteria included in subsections (b) and (c).

Reviewing this list of 223 pollutants and comparing it to the various lists of priority substances which have been published (by the Agency and others) throughout the history of the section 112 program indicates that this universe of substances adequately captures the toxic air pollutants of concern, with some exceptions. Most notably, no State has established an acceptable ambient concentration of dibenzofurans and this it does not appear on the list of 223 substances. Considering the evidence on the toxicity and emissions of dibenzofurans, and the fact that the Agency is currently conducting a detailed assessment of this pollutant for possible listing under section 112, the Committee has added dibenzofurans to the list of substances in the committee print bringing the total to 224 toxic air pollutants.

The Administrator is given authority to periodically review and revise the list by adding or deleting substances. A complete review must be conducted at least once every three years. In addition any person may petition the Administrator at any time to modify the list by adding or removing a substance. The Administrator is to grant or deny (with a written explanation) any petition within 180 days.

The Administrator shall add a substance to the list under either one of two conditions: (1) the petitioner has shown that the substance is an air pollutant that is known to cause or may reasonably be anticipated to cause adverse effects on human health or the environment; or (2) the petitioner has shown that the substance is an air pollutant which would qualify for addition to the SARA list by reason of subsection (d)(2) of section 313. That subsection describes three criteria which are generally: (1) acute human health effects; (2) chronic human health effects; or (3) significant adverse environmental effects. The criteria are more fully described at pages 293-295 of House Report 99-962, the Conference Report on the Superfund Amendments and Reauthorization Act of 1986, quoted below:

> . . . A chemical should be listed if the Administrator determines, in the Administrator's judgment, that there is sufficient evidence to establish any one of the following:
>
> 1. Acute human health effects—The chemical is known to cause or can reasonably be anticipated to cause significant adverse acute human health effects at concentration levels that are reasonably likely to exist beyond facility site boundaries as a result of continuous, or frequently recurring, releases.
>
> In making this determination, the Administrator is to consider individuals who are sensitive to a particular chemical. The determination that concentration levels capable of causing a significant acute adverse effect are reasonably likely to exist beyond facility site boundaries requires consideration of factors in addition to the chemical toxicity and other properties of a substance. For example, it is possible that a particular chemical, while it could cause a significant acute adverse effect at a high concentration level, would be very unlikely to reach that concentration level beyond the facility site boundary because of volume and pattern of use or release and other chemical-specific factors. To include a substance on the list on the basis of this criterion; the Administrator would determine that, within the United States, concentration levels that can cause the effects described above are reasonably likely to occur as a result of continuous or frequently recurring releases. The term "continuous or frequently recurring releases" is included only to distinguish routine releases that are a normal consequence of the operation of the facility from the episodic and accidental releases that are subject to section 304 (of SARA). There is no requirement to make any facility-specific finding, and it is not necessary actually to demonstrate these concentration levels or effects near any particular facility.
>
> The phrase "beyond facility site boundaries" means any point outside the boundaries of the site on which the facility is located. With regard to some types of chemicals and patterns of discharge and dispersal, the highest concentration to which persons outside the site boundary may be exposed will occur adjacent to the boundary. In other cases, the highest concentration may occur some distance away, as when an air emissions plume cools and settles to the ground.
>
> 2. Chronic human health effects—The chemical is known to cause or can reasonably be anticipated to cause in humans—
>
> (i) cancer or teratogenic effects, or
> (ii) serious or irreversible—

(I) reproductive dysfunctions,
(II) neurological disorders,
(III) heritable genetic mutations, or
(IV) other chronic health effects.

The phrase "in humans" in subsection (d)(2)(B) clarifies that health effects are to be considered insofar as they are or reasonably can be anticipated to be manifested in human beings as distinct from other organisms. It does not limit the Administrator to considering only substances for which there are human data.

3. Adverse environmental effects—The chemical is known to cause or can reasonably be anticipated to cause, because of—

(i) its toxicity,

(ii) its toxicity and persistence in the environment, or—

(iii) its toxicity and tendency to bioaccumulate in the environment, a significant adverse effect on the environment of sufficient seriousness, in the judgment of the Administrator, to warrant reporting under this section.

In determining what constitutes a significant adverse effect on the environment that would warrant reporting under this section, the Administrator should consider the extent to which the toxic chemical causes or reasonably can be anticipated to cause any of the following adverse reactions, even if restricted to the immediate vicinity adjacent to the site:

(1) Gradual or sudden changes in the composition of animal life or plant life, including fungal or microbial organisms in an area.

(2) Abnormal number of deaths of organisms (e.g. fish kills).

(3) Reduction of the reproductive success or the vigor of a species.

(4) Reduction in agricultural productivity, whether crops or livestock.

(5) Alterations in the behavior or distribution of a species.

(6) Long lasting or irreversible contamination of components of the physical environment, especially in the case of groundwater, and surface water and soil resources that have limited self-cleansing capability.

The use of the term "bioaccumulate" is not intended to distinguish between this term and other technical terms, such as "bioconcentrate" and "biomagnify" that sometimes are used interchangeably.

The number of toxic chemicals included on the list solely on the basis of adverse environmental effects as described above may not exceed 25 percent of the total number of listed chemicals.

In making a determination that a chemical meets any of the toxicity criteria under subsection (d)(2) the Administrator must consider generally accepted scientific principles

> of toxicity evaluation or, data from laboratory toxicity tests, or appropriately designed and conducted epidemiological and other studies of populations, available to the Administrator.
>
> The Administrator, in determining to list a chemical under any of the above criteria, may, but is not required to, conduct new studies or risk assessments or perform site-specific analyses to establish actual ambient concentrations or to document adverse effects at any particular location.

The Administrator is directed to remove a substance from the list upon a showing by the petitioner that one of two conditions obtain: (1) there is complete, valid and adequate data on the health and environmental effects of the substance and from such data the Administrator can conclude that ambient concentrations or emissions of the pollutant will not cause any adverse effects on either human health or the environment; or (2) the substance qualifies for deletion from the SARA list pursuant to subsection (d)(3) of section 113. The Administrator may provide general guidance for use by petitioners as to the evidence necessary to demonstrate that complete, adequate and valid data is available on the health and environmental effects of the substance. This is not intended to be an extraordinary data production requirement, but in light of the fact that the pollutant has already been listed because of health or environmental concerns, the testing required should include the full range of investigations that would be required of a high-volume chemical in commerce to complete an adequate health assessment as described in the National Research Council report "Toxicity Testing" and the Guidelines for Risk Assessment published by the Agency in September, 1986. This data would, of course, include exposure information adequate to demonstrate with a high degree of confidence that emissions, ambient concentrations or exposure through other pathways including atmospheric transformation products, or transmission through the food chain or water supply, will not cause adverse effects.

Criteria for the deletion of a substance from the list established under section 313 of SARA is stated in the Conference Report at page 295 and reads as follows:

> Subsection (d)(3) of the conference substitute provides that a chemical may be deleted from the list if there is not sufficient evidence to meet any of the criteria described in paragraph (2) (described above). A chemical need only meet one of the three criteria listed in subparagraphs (A), (B) or (C) of paragraph (2) to be listed. Similarly, a chemical will be deleted only if it fails to meet any of these three criteria.

When considering the adverse health effects from a toxic pollutant, the Administrator must include the extent to which such pollutant may adversely affect human health by contaminating the human food chain and surface waters used as drinking water supplies. Human exposure to airborne toxic chemicals that contaminate food and water may provide an important addition to the body burden for such chemicals beyond that already received through direct inhalation. As under present law, it is a sufficient basis for listing a pollutant that air emissions contribute (through multiple pathways) to the total body burden of that substance. It is not necessary to demonstrate that the contribution from direct inhalation of air emissions alone is sufficient to cause adverse health effects.

It is not expected that substances listed by the Agency for Toxics Substances and Disease Registry pursuant to section 104(i) of CERCLA will be deleted from the list, since those substances listed by ATSDR have demonstrated toxic effects and only those ASTDR-listed substances for which a State has set an acceptable ambient concentration now appear. It is also to be noted that ATSDR will be naming additional pollutants to its CERCLA section 104(i) list and that the Administrator may add substances to the SARA section 313 list. Where these pollutants or substances are clearly potential air pollutants (for instance, where States have set "acceptable ambient concentrations" as noted in the NATICH data base) the Administrator shall promptly add such pollutants or substances to the list established here.

The Administrator is directed to publish, within twelve months of the date of enactment, a list of the categories and subcategories of major emitting sources of the 224 air pollutants (initially) listed pursuant to paragraph (2) of this subsection. A technology-based emission standard will subsequently be promulgated for each category or subcategory. A definition for "major source" is included in subsection (a) and provides that a source emitting more than 5 tons of any listed pollutant or 25 tons of any combination of pollutants is a major source. The Administrator is given authority to include sources emitting a lesser quantity of pollutants in a major source category or subcategory, if the potency of the pollutant emitted or other factor would warrant the imposition of a technology-based emission standard. When air pollutants are subsequently added to the list established under paragraph (2), the Administrator shall simultaneously list the major source categories and subcategories.

To facilitate consistency in the regulatory process, the Administrator is expected to establish source categories and subcategories under this section so as to parallel, to the extent practicable, the categories and subcategories established under section 111 for new source performance standards and under part C for the prevention of significant deterioration (where new sources are subject to best available control technology requirements). This language is not intended to limit the listings under this paragraph to only those categories and subcategories already subject to other provisions. The categories and subcategories established here must include all major sources of the listed pollutants.

In establishing categories and subcategories, the Administrator may take into account factors such as industrial or commercial category, facility size, type of process and other characteristics of sources which are likely to affect the feasibility and effectiveness of air pollution control technology. Cost and feasibility are factors which may be considered by the Administrator when establishing an emissions limitation for a category or subcategory under this subsection. The proper definition of categories and subcategories, in light of available pollution control technologies, will assure maximum protection of public health and the environment while minimizing costs imposed on the regulated community. However, nothing in this language authorizes the establishment of a category or subcategory based wholly on economic grounds nor is there any implication that individual facilities may be granted categorical waivers (that is, that separate categories or subcategories will be established for one or a few sources) from requirements that would apply to other sources of a similar size, type or character based on assertions of extraordinary economic effects (as was provided through the "fundamentally different factors" rulemaking under the Clean Water Act).

The Administrator is specifically directed to include publicly owned treatment works (as defined in the Clean Water Act) and treatment, storage and disposal (TSD) facilities for hazardous waste (as defined in subtitle C of the Solid Waste Disposal Act) among the categories of major sources listed pursuant to this subsection. Both source categories were identified as significant contributors to the air toxics problem in the "Six-Month Study" published by the Agency in 1985. The Agency is in the process of setting air emissions standards for hazardous waste TSD facilities under section 3004(n) of the Solid Waste Disposal Act (RCRA). Although these regulations may in every way satisfy the requirements of subsection (b) of the amended section 112, integration of the RCRA regulations with the basic air toxics program established here is appropriate. The Agency has also indicated that air emissions standards for POTWs may be promulgated under the Clean Water Act. There is no standard of protection of either human health or the environment from releases to air under that Act. It is more likely that appropriate standards would survive a legal test, if established purusant to these new authorities of section 112 of the Clean Air Act.

No substance, practice, process or activity regulated under part B of the Clean Air Act (relating to the protection of the stratospheric ozone layer) will be subject to regulation under section 112(b) solely because of its impact on stratospheric ozone. The same substance may be regulated under section 112 due to its health impacts (for instance, carbon tetrachloride is both a probable human carcinogen on the "intent-to-list" list and has significant potential to deplete stratospheric ozone and, thus, would be appropriately regulated purusant to the provisions of section 112). Furthermore, there is not prohibition on addressing the ozone depletion properties of a substance or activity not regulated under part B in the context of emissions standards under this section.

The Administrator is directed to develop test methods and other analytical procedures for monitoring emissions and ambient concentrations of air pollutants listed pursuant to this subsection. The Agency already has an on-going program in this area. These methods must be specified with sufficient sensitivity to allow the owners and operators of sources, pollution control agencies, and others to distinguish reliably between major and area sources and to determine compliance with emission standards once established. Monitoring and analytical methods should be developed as expeditiously as practicable so as to be useful in the standard development effort. The unavailability of a monitoring or analytical methodology, however, shall not delay the establishment or enforcement of standards under this subsection. Where it is not feasible to measure emissions at all, subsection (f) of section 112 provides the Administrator with authority to prescribe design standards and work practices in lieu of emissions standards.

The Administrator may determine that a technique for measuring one pollutant may serve as a surrogate for measuring another, but only if the Administrator finds, after allowing an opportunity for comment, that there is a significant correlation between the emissions or ambient levels of such pollutants with a high degree of statistical confidence.

Paragraph (3) of subsection (b) gives definition to the technology-based standard which the Administrator is to employ in determining the appropriate emissions limitation for each category or subcategory of major sources. This paragraph is the counterpart to the phrase "provides an ample margin of safety to protect human health" which is the benchmark for health-based emissions limitations imposed under subsection (c).

Generally, the formula included here provides for the maximum degree of reduction in emissions for each pollutant which is achievable by the sources in the category taking cost and other factors into account. The benchmark for the categorical standard is not an average level (or some other percentile) of control across sources in the category, but the most stringent level of control achieved in practice by a source of a similar size, type and character.

In 1984 the Committee reported legislation to amend the Clean Air Act and at that time conducted a thorough review of the "best available control technology" concept as applied to new sources in the part C program for the prevention of significant deterioration. The report issued on that legislation indicated that the case-by-case BACT determinations being made for PSD were not sufficiently stringent and in many cases provided no more control than would have been required through application of new source performance standards. To rectify this insufficiency and to further integrate control technology requirements under various parts of the Act, the 1984 bill amended the BACT review under the PSD program, replaced LAER with BACT in the non-attainment program and proposed to add a BACT concept to section 112. Although the 1984 bill was not ultimately enacted and this legislation does not make extensive modifications to the PSD program, some of the conceptual work done for the 1984 bill is carried over to this new subsection establishing technology-based standards for major sources of non-criteria air pollutants.

An emissions limitation based on paragraph (3) will, in most cases, be more stringent than a new source performance standard for the same category of sources. It will also generally be more stringent than an emissions limitation based on reasonably available control technology imposed under part D as the emission limitation here must be equivalent to the most stringent degree of control achieved in practice. That is appropriate as this program is for the control of extremely harmful air pollutants and is also reflected in other provisions included in this section (the 5 ton definition of major source, the authority to go beyond a technology-based standard, the permit requirement, and so on). Emissions limitations promulgated under this subsection will be at least as stringent as LAER in most cases.

The technology-based standards promulgated pursuant to this authority shall provide for the maximum degree of reduction in emissions of each of the listed pollutants released by sources in the category. In some cases one control technology (scrubber, adsorber, secondary containment, steam-stripping, etc.) may be the best available technology for several or even a large class of the listed pollutants. In cases where a single control technology (combustion temperature, for instance) may be calibrated or configured in a variety of ways depending on the principal polllutant of concern, the Administrator shall select that configuration or calibration which provides the greatest protection to human health (unless the incremental health protection is negligible and there are very significant environmental values that would be afforded protection by some other configuration). In cases where control strategies for two or more different pollutants are in actual conflict, the Administrator shall apply the same principle—maximum protection of human health shall be the objective test.

There may be pollutants which because they are emitted from more than one point in a facility or because they are particularly difficult to control require the application of more than one control technology at the same site. For instance, adequate control of dioxin emissions form municapal waste combustion units is best achieved through a combination of good combustion practices and the installation of acid gas scrubbers. In another case, a particular VOC may be released from both a stack and from non-point sources in the facility. In the latter case, BACT will be determined for each type of emissions point and not for the facility as a whole.

The technologies, practices or strategies which are to be considered in setting emission standards under this subsection go beyond the traditional end-of-the-stack treatment or abatement system. The Administrator is to give priority to technologies or strategies which reduce the amount of pollution generated through process changes or the substitution of less hazardous substances. A second class of control requirements focusing on the enclosure of emissions points or other secondary containment systems is also to be considered before systems to collect, capture or treat the emissions are reviewed. Considering municipal waste combustion as a potential category of majojr sources to illustrate these concepts (even though standards for MWC are set independently by another provision of this legislation): source separation and good combustion are examples of process modifications; covered facilities for ash handling and negative air flow are examples of enclosure and secondary containment; and scrubbers, precipitators and selective catalytic reduction are examples of end-of-the-stack treatment systems. All three approaches are to be considered in determining the degree of control which is achievable for each category or subcategory.

The Administrator may take the cost of achieving the maximum emission reduction and any non-air quality health and environmental impacts and energy requirements into account when determining the emissions limitiation which is achieveable for the sources in the category or subcategory. Cost considerations are reflected in the selection of emissions limitations which have been achieved in practice (rather than those which are merely theoretical) by sources of a similar type or character. An emissions limitation achieved in practice is one based on control technology that works reasonably well (i.e., doesn't require frequent and extensive modification or repair) under realistic operating conditions. This is not a cost-effectiveness or cost-benefit test. Specifically, the policy enunciated by the Office of Management and Budget in a letter to Mr. Milton Russell signed by Mr. Chris DeMuth and dated December 9, 1983, calling for a cost-effectiveness test in the NESHAPs for inorganic arsenic and radionuclides is rejected. The number of cancers prevented per dollar invested is not any part of the definition of best available control technology as used here (or elsewhere in the Act).

When establishing technology-based standards under this subsection, the Administrator may consider the benefits which result from control of air pollutants which are not listed but the emissions of which are, nevertheless, reduced by control technologies or practices necessary to meet the prescribed limitation. For instance, control technologies which reduce the emission of volatile organic compounds that are listed pursuant to this subsection may also have the effect of limiting other VOC emissions. These other compounds, although not listed, would be precursors of ozone pollution and control, even in attainment areas, may produce substantial health and environment benefits.

In no event shall an emissions standard promulgated under this subsection allow a source to increase emissions above that which is otherwise required pursuant to section 111 (new source performance standards), part C (prevention of significant deterioration, requiring case-by-case BACT), or part D (non-attainment, requiring either RACT or LAER).

Paragraph (4) requires the Administrator to establish leak prevention, detection and correction requirements as part of the emissions standard for each category of sources. This paragraph covers both equipment leaks (formerly called "fugitive emissions" by EPA) and emissions from storage tanks. Equipment leaks are responsible for the largest percentage of the emissions in many facilities handling toxic chemicals. In some cases, the Agency has defined equipment leaks and storage tanks as separate source categories. In other cases, EPA considers equipment leaks and storage tanks as part of the basic units regulated. The provisions included here will require that emissions standards address all of the emissions within the facility, whether from stacks, vents or other process units and from equipment leaks and storage tanks.

EPA has issued a generic equipment leak standard which can be applied to leaks of hazardous air pollutants from oil refineries, chemical plants, and other sources. To this date, however, the regulation has only been applied to benzene emissions. And that regulation does not necessarily reflect the maximum degree of emissions reduction which is achievable. For example, it does not require the use of valves which the Agency has described as "leak-free" or pumps with double seals, despite the fact that both types of equipment are commercially available and have been demonstrated in practice. In addition, the current standard does not require preventive maintenance and repair practices that also have been demonstrated in practice. Standards meeting the test of paragraph (3) of this subsection will require these and other control technologies.

The amendments authorize the Administrator to establish annual audit and safety inspection requirements as part of the leak prevention, detection and correction standards. Such requirements shall be included in each emission standard unless there is good reason for not requiring such audits and inspections. The annual audit and inspection is intended to be an especially thorough examination of the facility, above-and-beyond the care required for day-to-day operations. The objective of the audit and inspection is to locate and correct all leaks and conditions that could give rise to either routine or episodic releases in the future. The results of these audits and inspections and any other safety inspections of a facility subject to an emissions standard are to be available to the Agency, the State in which the facility is located and to the public, subject to the confidential business information provisions of the Emergency Planning and Community Right-to-Know Act of 1986.

Paragraph (5) of subsection (b) allows a period of five years before compliance with a technology-based standard issued under this section is required of a source which has installed best available control technology (BACT) pursuant to requirements under part C of the Act or reasonably available control technology (RACT) or technology which provides for attainment of the lowest achievable emissions rate (LAER) pursuant to requirements under part D of the Act. The purpose of this extension is to allow some portion of the cost of meeting those requirements to be amortized before additional requirements are imposed. The 5-year extension period commences on the date on which BACT, RACT or LAER technology becomes operational, but not if a more stringent emissions limitation has been proposed under this subsection before that date. In other words, sources may not choose to avoid already proposed and more stringent requirements under this subsection by complying with less stringent BACT, RACT or LAER requirements. Extensions are not to be granted for minor modifications in BACT, RACT or LAER equipment, but only as the result of major retrofits or initial expenditures necessary to come into compliance with parts C or D. The extension allowed here is not in addition to the compliance period or source-specific waiver for existing sources established under subsection (d), but shall run concurrently with such compliance schedule, and shall terminate not later than five years from the date that the qualifying control technology is put into service. This extension must be granted by the Administrator (or a State acting pursuant to a program approved under subsection (e)) on a case-by-case basis through permit requirements.

Paragraph (6) of subsection (b) provides a schedule for the promulgation of technology-based standards under this subsection and criteria for establishing priorities for regulation among the various categories and subcategories of major sources for which standards must be set. The Administrator is to publish a complete list of the source categories and subcategories of the 224 (initially) listed pollutants within twelve months of the date of enactment. Emissions standards for the source categories of eleven pollutants (generally, those in the so-called "intent-to-list" group) are to be effective (that is promulgated) within 18 months. These pollutants are: acrylonitrile; butadiene; cadmium; carbon tetrachloride; chloroform; chromium; ethylene dichloride; ethylene oxide; methylene chloride;

perchloroethylene; and trichloroethylene. The Agency can without difficulty meet this schedule, since these pollutants and their source categories have been studied for several years under the existing program. If the Administrator chooses a technology-based standard for coke oven emissions, as authorized by language in subsection (c), that standard must also be effective within 18 months of enactment.

As to standards for major source categories and subcategories of the 213 other listed pollutants, the legislation establishes a three-part schedule. Emissions standards for 25 percent of the categories and subcategories must be effective within 3 years of enactment; standards for another 25 percent of the categories and subcategories must be effective within five years of enactment; and standards for all remaining categories and subcategories of major sources of the listed pollutants must be effective within 10 years of enactment. This scheduling device has been used previously in amendments to the Clean Air Act (with respect to new source performance standards under section 111 adopted by the Congress in 1977). A somewhat longer period of time was required to promulgate technology-based effluent guidelines under the Clean Water Act, but the greatest part of that activity was concluded within a comparable schedule.

When selecting source categories and subcategories to include within the first or second round of standards (to be issued within 3 or 5 years), the Administrator is to give highest priority to those major source categories which present the greatest threat to public health and the environment because of: (1) the quantity of pollutants that will be emitted; (2) the nature and severity of the adverse health and environmental effects which will be potentially caused; or (3) the high risks experienced by the most exposed persons due to the location of the sources in that category or subcategory. The priority-setting process will not require a rule-making or other complex or resource intensive undertaking. The Administrator is given considerable discretion in setting priorities, however, the schedule for standards should not repeat the experience under the Clean Water Act where the largest and most important category of toxic pollutants, the synthetic organic chemical manufacturing industry, was deferred until the end of the promulgation period.

The Administrator is to review and revise emission standards promulgated under this subsection no less often than every five years.

As provided in subsection (d), technology-based standards for major sources promulgated under this section shall be implemented through the issuance of permits to such sources, both new and existing, either by the Agency or by a State acting pursuant to a program approved under subsection (e).

Technology-based emissions standards promulgated under subsection (b) shall be effective on the date of promulgation and, with respect to new sources, shall be applicable to all such sources which began construction or modification at any time after the standards were first proposed.

Through a series of studies conducted earlier this decade, the Environmental Protection Agency has determined that only a part of the air toxics problem results from the large chemical and industrial facilities which one normally associates with hazardous air pollutants. A substantial portion of the air toxics problem may, in fact, be caused by much smaller, diverse sources of these air pollutants. The so-called "area sources" include wood stoves, apartment building boilers and other small combustion units, dry cleaners, service stations, and automobiles, trucks and buses.

In its air toxics strategy proposed in 1985 the Agency put forward the beginning elements of a national program to address these area sources of harmful pollutants. In many cases, the authorities of section 112 (promulgation of emissions standards or alternative design and work practices standards) would have been cumbersome tools, at best, to achieve reductions in pollution from these sources. The Agency, therefore, turned to other authorities in the Clean Air Act (new source performance standards and mobile source tailpipe standards) and other statutes (the Toxic Substances Control Act, principally) to develop the needed tools. None of the 1985 strategy for area sources has actually been implemented, but the new subsection (b) proposed in this legislation builds on the Agency's suggestions to address this portion of the air toxics problem. The legislation establishes a list of area source categories, a 1988 inventory of area source emissions and a national objective to reduce this inventory by 55 percent over a 10-year period.

The air pollutants which are the subject to the area source provisions are the same 224 pollutants listed according to subsection (b)(2). This list may be expanded in the future, and if it is, the Administrator is to amend the 1988 inventory to reflect emissions (as estimated) from area sources of the pollutants added to the list.

Not later than 12 months after promulgation, the Administrator is to publish a list of categories and subcategories of area sources which emit any one of the 224 pollutants. No policy determination is involved in listing a source category pursuant to this requirement; it is simply a ministerial function. The categories will reflect not only the area sources traditionally mentioned, but will include categories which parallel those for major sources listed pursuant to paragraph (2)(D) of this subsection covering individual facilities, activities or sources with emissions (or the potential to emit) less than 5 tons per year of any one of the 224 pollutants.

The list of source categories is to include a list of sources named in the legislation: degreasing and solvent cleaning operations; dry cleaners; pesticide applications; wood combustors; other small combustion units; gasoline marketing; mobile sources; and materials transportation. These eight categories were mentioned frequently in the studies which led up to EPA's 1985 air toxics strategy and are named by statute for that reason. They reflect only a small portion of the source categories which will appear on the Administrator's list.

At the time that a category is listed, the Administrator is to estimate the total emissions of the 224 pollutants (pollutant-by-pollutant, to the extent practicable) from all of the individual sources in that category. The Administrator may use the authority of new subsection (h) of section 112 (or section 114 of current law) with respect to monitoring to gather, through surveys or other studies, the data necessary to estimate emissions. No objection to such information gathering may be made by the Office of Management and

Budget under the Paperwork Reduction Act, as this is a statutory requirement. These emissions estimates are to be for the year 1988. If a category is listed after the 1988 calendar year, the Administrator shall estimate the likely emissions of that category in 1988 for inclusion in the national inventory unless it is impractical to make an estimate or the emissions from the newly-listed category have increased substantially since 1988. In either of those two cases, the Administrator shall base the inventory on the most recent calendar year for which emissions estimates can be made.

The inventory is a summary statement of the total emissions of each of the 224 listed pollutants (and pollutants subsequently added to the list) from area sources in 1988. The inventory may be amended periodically to reflect improved estimates of the 1988 emissions inventory.

The legislation establishes as a national objective a 55 percent reduction in this inventory of air pollutants from area sources over a 10-year period. The reductions are to be accomplished in four phases: an initial reduction of not less than 25 percent not later than four years after enactment; and further reductions of 10 percent every two years in each of three cycles ending 6, 8, and 10 years after enactment.

The reduction objective is applicable to the total national inventory and does not imply that emissions of any particular pollutant or from any particular source category are required to be reduced by the specified percentages on or before the deadlines. Thus, reductions in emissions resulting from a source like pesticide applications may not occur at all while reductions beyond the 55 percent objective may be achieved for other source categories. There is also no implication that each urban area, State or other geographic unit must achieve a total reduction of 55 percent.

Analysis available to the Committee from several sources indicates that the objective will be easily achieved, if the provisions of titles I through IV of this bill are fully implemented and EPA follows through on other mobile source and air toxics regulatory proposals which have been announced. That analysis appears to be accurate. However, the objective that area source emissions be reduced by 55 percent is independent of these other provisions and should drive policy at the Agency whether the other provisions and proposals are effectuated or not.

The Administrator is authorized to use a wide variety of authorities to achieve these reductions. These authorities include, but are not limited to, emissions standards, leak prevention requirements and design and work practice requirements under section 112 of the Clean Air Act; new source performance standards under section 111 of the Act; mobile source and fuel regulation under title II of the Act; areawide strategies including transportation control measures developed under section 110 of the Act; section 6 of the Toxic Substances Control Act; and the available authorities of the Resource Conservation and Recovery Act and the Federal Insecticide, Fungicide and Rodenticide Act. Although the selection of authorities to achieve the objective is discretionary, the combination of measures put in place are to achieve the 55 percent reduction from the 1988 inventory in a 10-year period.

No requirement imposed in the area source provisions of this legislation alters the character of these other requirements. For instance, nothing in this provision would affect the risk balancing decision-making process which is established by FIFRA for the regulation of pesticides. The necessary justification for control of the volatility of pesticide products or of the method of their storage and application is to be made within the context of the FIFRA regulatory program and is not affected by the amendments in this paragraph. (Pesticide emissions may, of course, be subject to regulation under the technology-based or health-based standards of subsections (b) and (c)). Nevertheless, the objective set forth here may well initiate review of pesticide emissions and cause actions to be taken to reduce unnecessary or unreasonable risks pursuant to FIFRA authority.

The area source program is not expected to be delegated to State and local pollution control agencies. However, the Administrator may accomplish some portion of the national objective through milestones included in State and local program guidance, where appropriate.

Although it might be possible to achieve the overall objective (or some phase of the program) by substantially reducing emissions of one or a few pollutants with low or moderate toxicity (toluene), the purpose of this program is to protect human health and the environment and the Administrator is to design a strategy for achieving the objective with that purpose paramount. It is expected that the focus of the area source strategy will be on those pollutants (including, but not limited to, formaldehyde, chromium, products of incomplete combustion, and benzene) which account for a large portion of the cancer risk in urban areas.

Nothing in these provisions would authorize the regulation of mobile source emissions by State or local pollution control authorities where that regulation would be prohibited by other provisions in the Act.

The Administrator is to report to the Congress at 5 and 10 year intervals on the measures taken to accomplish the objective.

HEALTH-BASED STANDARDS

SUMMARY

The bill modifies the provisions of section 112 of the Clean Air Act which authorize the listing of hazardous air pollutants and the promulgation of emissions standards for sources of such pollutants at a level which provides an ample margin of safety to protect public health. The amendments included in this section clarify the conditions under which such pollutants should be listed and add adverse environmental effects to the factors which would warrant the listing and control of a pollutant.

The major portion of the regulatory activity under the modified section 112 will, in the near-term, be conducted under authority of subsection (b) in the promulgation of technology-based standards. Use of the authorities in the modified subsection (c) is for pollutants which would, even after regulation under subsection (b), continue to present risks of concern to public health or environmental resources.

To assure that pollutants (including those subject to technology-based regulations) will continue to be evaluated for their health and environmental consequences, the Administrator is directed to conduct a program of assessments including research on the health and environmental effects of the pollutants, the sources of emissions and the level of human exposure to the emissions. This assessment program is not unlike the program currently conducted by the Agency. Assessments lead to a determination to list (or not to list) a substance as a hazardous air pollutant. It is expected that the Agency will continue to put significant resources into this process and that assessments will be commenced for 10 to 15 pollutants (or source categories) per year. Assessments are to be completed in 2 years, but should the assessment find that insufficient data for a listing decision is available, the agency is authorized to conduct a further research program and recover the costs of such research from the owners or operators of facilities which routinely emit the substance under study.

Provisions of current law requiring that the health-based emission standards provide an ample margin of safety to protect public health are preserved, unless a more stringent standard is necessary to protect the environment. To clarify congressional intent, statutory language is added prohibiting the consideration of costs or other factors in determining the appropriate standards.

The Administrator is given authority to establish interim standards for two classes of pollutants, probable and possible carcinogens, at a level which may provide other than an ample margin of safety to protect public health provided that such standards reduce the risk of excess cancer to the most exposed individual to one in one million or less.

Standards are to be promulgated for all source categories not later than 3 years after a pollutant is listed and shall be effective for new sources on promulgation. The Administrator may give existing sources an extended period for compliance under authority of the amended subsection (d) described below.

DISCUSSION

The 1970 Clean Air Act required the Administrator to compile a list of hazardous air pollutants (non-criteria pollutants causing increased mortality or serious irreversible, or incapacitating, reversible, illness) within 90 days of enactment. Over the 17-year history of the Clean Air Act eight air pollutants have been listed as hazardous: mercury (1971); beryllium (1971); asbestos (1971); vinyl chloride (1975); benzene (1977); radionuclides (1979); inorganic arsenic (1980); and coke oven emissions (1984). Emissions standards for source categories of each listed pollutant were to be promulgated within one year of listing and were to provide an "ample margin to safety to protect public health."

Subsection (c) of the amended section 112 preserves (although with modifications) the basic authorities established by the 1970 Act. The Administrator is to list air pollutants which meet the definition of hazardous air pollutant (found in subsection (a)) or the new criteria for listing established under subparagraphs (B) and (C) of subsection (c)(1). These criteria are discussed below.

The resulting list of pollutants for which health-based emissions standards are to be promulgated will include at least those eight pollutants already regulated (although the Administrator is authorized to promulgate an alternative standard for coke oven emissions under subsection (b)).

At the time a substance is listed for a health-based standard under this subsection the Administrator is also to list categories and subcategories of facilities and activities which emit the listed pollutant. There is no quantitative threshold which brings a source into the regime of subsection (c). All sources are to be addressed and classified as to category.

Current law contains a phrase which may appear to exclude from regulation under section 112 pollutants which are already regulated as "criteria" pollutants under section 109. However, some pollutants may appropriately be regulated under both sections because there is more than one aspect of their contribution to air pollution. For instance, benzene is a volatile organic compound which may be a precursor to ozone formation, a widespread air quality problem addressed under section 109. Benzene is also a potent, known human carcinogen and those effects have led to listing of benzene under section 112. Similar examples could be given for other VOCs or for metals contributing to particulate emissions. To clarify existing law and confirm actual practice, the reference to "criteria" pollutants contained in section 112 is deleted by these amendments.

Although coke oven emissions have been listed as a hazardous air pollutant under section 112 and an emissions standard has been proposed, some doubt as to the regulatory status of coke oven emissions continues. Coke oven emissions are a known human carcinogen presenting extraordinarily high risks to the most exposed individuals. Risks in the range of 2 excess cancer cases for every 100 people exposed have been measured. There are 42 coke oven facilities (with 140 batteries) in operation in the United States, today. Given the health effects information available, coke oven emissions were appropriately listed for a NESHAP under section 112.

However, the emissions standards which have been proposed for coke ovens do not appear to provide an "ample margin of safety to protect public health" as required by law. In fact, they are "lowest common denominator" regulations requiring no more control technology than is affordable by the least economically viable facility and allowing risks even after regulation in the 1-in-100 range. Cost and feasibility were the criteria used to write this standard and as such it is likely to be overturned (were it even promulgated) as a result of the recent court decision in *NRCDC* v. *EPA* (824 F.2d 1146) which requires that "safety" be the point of departure when setting standards under section 112.

Health-based standards under the new subsection (c) should be established for coke oven emissions. This pollutant is in all respects a candidate for regulation under these new authorities. Nevertheless, and only in light of the dismal record that the Agency has compiled using comparable authorities under current law, to assure that coke oven emissions will be addressed in the near-term, paragraph (1)(A) provides the Administrator with an option to set technology-based standards for coke oven emissions under subsection (b). If the Administrator elects to set a technology-based standard, it must provide the maximum degree of emissions reduction which can be achieved through application of the best available control technology, as provided in subsection (b). The emission limitation established by the standard must be at least as stringent as the lowest emission rate achieved by an existing coke oven. Coke ovens consist of several discrete units, e.g., pushing, charging, etc. The lowest emissions rate for pushing operations and the lowest emissions rate for charging operations may have been achieved at different facilities. The proposed standard issued in April of 1987 would not meet the test of best available control technology as contained in subsection (b).

Boilers burning oil and coal emit many of the hazardous air pollutants which have been listed pursuant to the existing section 112 (including radionuclides, arsenic, mercury and beryllium) and some which are on the so-called "intent-to-list" list (including cadmium and chromium). Nevertheless, no NESHAP for boiler emissions of these pollutants has been promulgated under current law. Because the language of amended section 112 requires that emissions standards be promulgated for all sources, boilers would be subject to health-based standards upon enactment of this legislation.

In reviewing the Committee Working Paper approved by the Subcommittee on Environmental Protection, the Agency noted that there may be substantial cost ($2.8 billion annually) associated with health-based standards for boilers with respect to the listed pollutants. To avoid such a large commitment of resources to the control of radionuclide and arsenic emissions from boilers at a time when other pollutants and source categories appear to present a greater threat to public health, the reported bill allows the Administrator the option of controlling emissions of the pollutants initially listed under subsection (c) (already listed under section 112) from boilers with technology-based standards established pursuant to subsection (b).

Considering the evidence on the toxicity of and human exposure to a wide range of air pollutants, there has been insufficient use of the authorities of section 112 of the Clean Air Act to protect public health. To provide more certainty and speed in the standard-setting process for potentially hazardous air pollutants, the bill adds new authorities to section 112. Foremost among these is the requirement that EPA promulgate technology-based standards for the major sources of listed air pollutants. The number of air pollutants which may present a threat of increased mortality or morbidity will be greatly reduced by implementation of these technology-based standards.

However, the technology-based standards may not be adequate to protect against risks from some air toxics for various reasons. First, best available control technology standards applicable to major sources may not sufficiently reduce emissions to protect against all health and environmental effects of concern. Second, emissions of concern may come from sources not subject to the technology-based regulations (e.g. small, so-called "area sources" emitting less than 5 tons per year of pollutants). Third, some sources may emit more than one pollutant with aggregate, additive or synergistic, health and environmental effects not adequately controlled by technology-based regulations. The authority to set health-based standards contained in current law is retained in modified form for use by the Administrator in the event that technology-based standards are not sufficiently protective to mitigate all risks of concern to public health and environment.

Regulation of pollutants listed under subsection (b) is mandatory under the bill. The Administrator has the latitude to choose not to issue health-based standards under subsection (c). But the latitude is to be exercised with discretion, prudence and caution, based on full consideration of the health and health-related impacts of the decision.

To define more clearly the circumstances in which the health-based authorities of subsection (c) will be used, the Administrator is required within 12 months of enactment to promulgate criteria for listing hazardous air pollutants. These criteria will describe the conditions which the Administrator would consider sufficient to list a specific air pollutant for regulation under subsection (c). To some extent the basis for these criteria will be similar to the basis for listing under the current section 112. As with current law, the Administrator is to list an air pollutant when (even after regulation under subsection (b)—

> It may reasonably be anticipated that the air pollutant will cause or contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness . . .

In addition, the Administrator is to list a pollutant when (even after regulation under subsection (b)—

> it may reasonably be anticipated that the air pollutant will cause significant adverse effects to the environment
> * * *

Health-based standards for a pollutant may be set before any technology-based standard for that pollutant has been issued. It is not necessary that a substance actually have regulations promulgated under subsection (b) or that facilities already be in compliance with such regulations, for the Administrator to decide that "even after regulation under subsection (b)" further health or environmental concerns would remain for which regulation under subsection (c) is appropriate. This may be apparent to the Administrator early in the regulatory development process.

The most difficult regulatory decision under the current section 112 occurs with respect to the regulation of carcinogens. Standards under the current law are required to "provide an ample margin of safety to protect human health". Because there may be no "threshold" level of exposure to a carcinogen below which there are no health effects, and therefore no "safe" level of human exposure to a carcinogen, it has been difficult for the Agency to use this mandate to develop emissions standards for carcinogens.

To resolve this dilemma in part, the bill authorizes the Administrator to set interim health-based standards for two classes of air pollutants, probable and possible carcinogens, at a level where the expected increase in cancer incidence to the potentially most exposed individual would not exceed a risk of one in one million (1x10^{-6}). This provision is intended to facilitate the use of health-based standards by providing a more objective benchmark for the emissions standards which apply to these two difficult classes of carcinogens. In evaluating pollutants or promulgating standards, of course, the Administrator must treat all forms of cancer as equally significant.

The bill does not require that every pollutant or carcinogen which presents a cancer risk to the most exposed individual in excess of one in one million be regulated under subsection (c). Nor does the bill require that health-based standards be issued in every case where technology-based standards are not sufficient to reduce such risk to less than one in one million. Just as current law requires a balancing of many considerations (all health-related), the new subsection (c) will require a weighing of all the health and environmental effects evidence. The decision to establish a standard, or not to establish a standard, requires the consideration of a variety of non-economic factors. These may include not only the size of the population exposed and the magnitude of the risk, but the sensitivity of the group exposed, the likelihood that the pollutant also causes other harm (e.g. to the environment), the certainty of the data, and the additive or synergistic effects of multiple pollutants emitted from a single source which warrant regulation because of the aggregate risk. Both relatively small risks to large populations and relatively large risks to small populations may warrant listing of an air pollutant under subsection (c).

The formal risk assessment procedures for carcinogenicity (and other health effects) now used by the Agency may contribute to the information on which a listing determination is made, but no mechanistic procedure, form of analysis or statistical inference can identify those air pollutants which will continue to present risks of concern even after the implementation of standards under subsection (b). In deciding whether to list a substance under subsection (c), the Administrator will need to consider the full range of health and environmental effects associated with emissions of the substance.

Subsection (c) (1) (D) directs the Administrator to conduct an assessment program with respect to the health and environmental effects of various pollutants (including those for which technology-based standards have been promulgated under subsection (b) to determine whether those effects would warrant listing under subsection (c) pursuant to the criteria just described. A program of assessments of this kind is currently being conducted by the Agency and these provisions are intended to support those efforts within legislatively defined parameters. This program is to be in addition to the research and investigations necessary to implement the new subsection (b).

The assessments may be conducted for individual substances or classes of such substances (olefins, aromatics, etc.). Classes may include emissions from a particular source category (coke oven emissions, for instance).

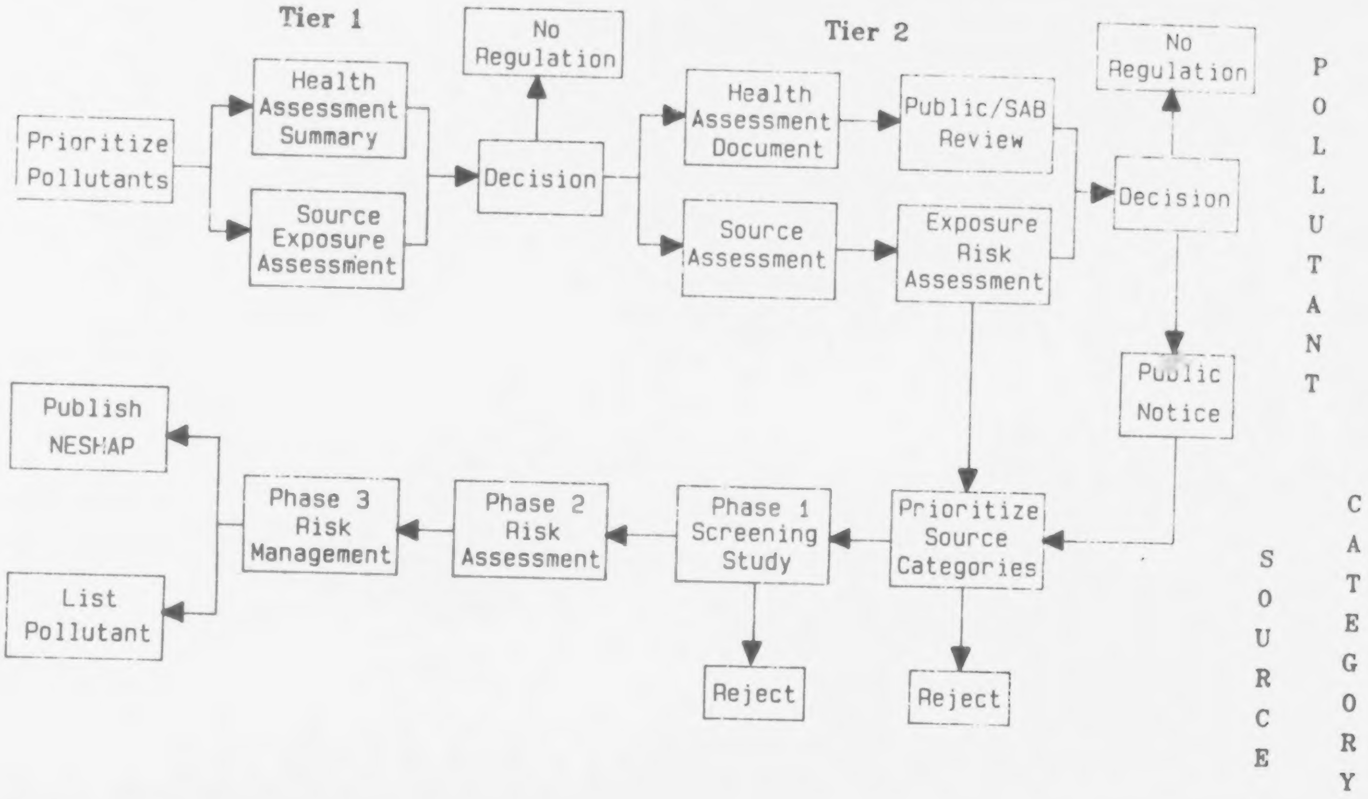
Each year the Administrator is to publish a list of pollutants for which assessment will begin in the following year. To the extent practicable assessments are to be completed within two years of the date on which they are initiated. The Administrator is to take comment on the published list, but listing is not a rule-making and is not subject to judicial review. When a substance is listed for assessment, the Administrator should establish a docket to receive scientific information and other comments of the public. This docket, providing an opportunity for interested persons to submit information for Agency consideration, is to be comparable to that required under section 307(d)(2), (3), (4), and (5). It is not, however, intended to convert the assessment process into a rulemaking.

In the fiscal year 1987 the Agency commenced assessment for 14 pollutants and had assessments underway for a total of 36 substances. it is expected that a program of similar scope will be conducted under this new authority, although no specific target or schedule is mandated.

The director of the National Toxicology Program may make recommendations on the pollutants to be assessed.

FIGURE V. 9.

NESHAP Process


Tier 1
Tier 2
Prioritize Pollutants
Health Assessment Summary
Source Exposure Assessment
Decision
No Regulation
Health Assessment Document
Source Assessment
Public/SAB Review
Exposure Risk Assessment
Decision
No Regulation
Public Notice
POLLUTANT
Prioritize Source Categories
Reject
Phase 1 Screening Study
Reject
Phase 2 Risk Assessment
Phase 3 Risk Management
Publish NESHAP
List Pollutant
SOURCE CATEGORY

The actual assessment process is presented schematically in figure V. 9. taken from briefing material prepared by the Environmental Protection Agency. Generally, the assessment process discussed here flows across the top of this figure. The Tier 1 or initial screening takes from 6 to 9 months and provides preliminary information on the adverse health effects of a pollutant and the sources which may lead to human exposure. In almost all cases this preliminary screening is followed by a Tier 2 or detailed health assessment requiring 18 to 21 months to complete. The review includes preparation of a formal health assessment document summarizing the research available on the health effects of the pollutant. This document is submitted to the Science Advisory Board for comment and may be subsequently amended to fill identified gaps and inadequacies. SAB review has frequently led to protracted delay in the development of emissions standards for hazardous air pollutants. Although the comments of the SAB are valuable and its oversight role should be continued, the review and comment procedures must not become so bureaucratic as to routinely and unnecessarily impede needed progress in regulating hazardous air pollutants.

The Tier 2 detailed assessment also includes preliminary risk analysis which in the case of carcinogens establishes a unit risk for the substance as an air pollutant and for noncarcinogens a threshold, below which exposure will lead to no adverse health effect.

The current two-part assessment process is designed to be completed with 2 to 2½ years, a goal which can be achieved when the assessment process has the support of the Agency's leadership.

At the conclusion of the assessment process established in this legislation the Administrator is called upon to decide whether or not the evidence supports listing the substance as a hazardous air pollutant. The Administrator has in the past made such decisions on 32 occasions—in 18 cases deciding to list a pollutant and in 14 cases deciding that a NESHAP was not necessary. However, in only 8 of the 18 cases where a determination was made that a NESHAP was warranted has the Administrator actually listed the substance. In the other 10 cases, the Administrator announced his "intent" to list the substance at some later date—presumably after the second phase of the assessment process depicted across the bottom half of Figure V. 9. was completed. The actual listing of an air pollutant, has under current law, triggered a regulatory calendar requiring proposal of a standard within 180 days and promulgation of the standard 180 days later. On no occasion has the Agency ever met these deadlines, and thus the "intent-to-list" concept was developed in an attempt to avoid exposure in litigation for what has been a continuing failure of the Agency to meet deadlines mandated by law. The amendments made by this legislation extend the period for promulgating a NESHAP after a pollutant has been listed to 3 years. Under that statutory structure there will be no need for an "intent-to-list category and the Administrator's determination at the conclusion of a 2-year assessment period is to provide for the immediate listing of the pollutant if the health or environmental criteria have been satisfied, whether or not the Administrator has information with respect to the control technologies and other requirements that will be necessary to establish an appropriate emissions limitation.

At the conclusion of the 2-year assessment, the Administrator may in the alternative (to immediately listing the pollutant pursuant to subparagraph (B)) determine that the criteria have not been satisfied and listing is not warranted or that sufficient information for a determination is not available and that further research must be conducted. Before making a determination the Administrator shall provide an opportunity for comment on the health assessment document and other information available.

As under current law the listing of a pollutant is not a final agency action. It is the emissions standards which result from the listing determination which are subject to judicial review. In contrast, a determination not to list a substance, which means that no emissions standards will be promulgated, is a final action and is subject to review. When any determination is made (whether to list, not to list or to conduct further research) the Administrator is required to publish a statement of the basis for the determination and the information that was available and reviewed.

If the Administrator determines after a 2-year assessment process (or at any time during that review) that sufficient information on the health and environmental effects of a pollutant are not available to make a listing determination, the Administrator is directed as a non-discretionary duty to develop and publish a research program which when carried out will secure the necessary information.

The lack of health and environmental effects information on the thousands of chemicals released to the environment through industrial and commercial activities is of great concern. In 1984, the Committee held hearings on the report "Toxicity Testing: Strategies to Determine Needs and Priorities", which was commissioned by the National Toxicology Program and which was prepared by the National Research Council. The major conclusion of the report is stated as follows:

> A select universe of 65,275 substances that are of possible concern to the National Toxicology Program (NTP) because of their potential for human exposure was identified. Through a random sampling process, 675 substances covering seven major intended use categories were selected. From this sample, a subsample of 100 substances was selected by screening for the presence of at least some toxicity information. In-depth examination of this subsample led to the conclusion that enough toxicity and exposure information is available for a complete health-hazard assessment to be conducted in only a small fraction of the subsample. On the great majority of substances, data considered to be essential for conducting a health-hazard assessment are lacking. By inference, similar conclusions were made for the select universe from which the sample and subsample were drawn.

Although complete, partial or minimal data was available for 36 percent of the pesticides, 26 percent of cosmetic ingredients, 39 percent of drugs and 20 percent of food additives, there was no toxicity information available at all on approximately three-quarters of the chemicals in commerce with 1 million pounds or more of production per year. For no chemical in commerce (excluding pesticides, drugs, cosmetics and food additives) was the data considered complete (for the purposes of a health assessment) and partial or minimal data was available in only 20 percent of the cases.

Responding to the concerns raised by this report the Congress included in the Superfund Amendments and Reauthorization Act of 1986 (SARA) provisions which will: (1) assure more health and environmental effects testing of substances released into the environment; and (2) impose the costs of that testing on those who manufacture, import, process or use those chemical substances. Those two policy goals are extended to the research programs which are established pursuant to the new subsection (c)(1)(E) of section 112.

If the Administrator finds that insufficient information is available to make a listing decision, the Administrator shall publish a research program describing the tests and attendant protocols necessary to assure that the information will be available. The program shall be sufficiently expeditious to assure that a further determination can be made no later than 5 years after the program is initiated (to allow sufficient time for research based on animal bioassays).

The research activities required by title V are very similar to existing research procedures for assessing the risks posed by hazardous air pollutants. In the process of developing Hazard Assessment Documents, knowledge and data gaps are routinely identified. The type of research activities that would be needed to generate data to fill these gaps would depend, of course, on the nature of the needed information. If there are insufficient data to characterize adequately the health effects, animal studies or epidemiology studies might be initiated. In some instances, it may be appropriate to undertake analyses of the potential for adverse environmental effects. Studies might also be necessary if there are questions regarding the extent or nature of emissions, the types of emissions sources, the appropriateness of various source control technologies, the level of ambient concentrations, the potential for atmospheric transformation products, or the extent to which geographic or meteorological conditions affect ambient concentrations or chemical transformations. In any or all of these instances, it may be necessary to develop new test procedures or monitoring techniques where existing procedures are insufficiently sensitive or where there are no existing procedures. In light of the expectation that monitoring or testing may be relatively frequent, there may also be a need to develop procedures that are less complex or less time consuming.

Within 90 days of the publication of the proposed program any person may: (1) provide the results of research which fulfills the testing requirements; or (2) undertake or commit to undertake the necessary research. This is an opportunity for those who produce, import or use or emit the substance to enter into voluntary arrangements to supply the health and environmental effects testing.

In the absence of voluntary commitments to provide the necessary testing, the Administrator is to initiate the research program 90 days after it is proposed. The research may be conducted by or in cooperation with other agencies of the United States. The Federal government may seek reimbursement for the costs of the research from those who own or operate facilities emitting the pollutant and they shall be liable for such costs in an action brought by the Administrator in the appropriate district court of the United States. The Administrator may develop a scheme to allocate the costs among such entities when there is more than one facility emitting the pollutant. It is not necessary that all facilities be subject to cost recovery action. Emission quantities reported pursuant to section 313 of SARA would serve as an equitable base for such an allocation, and to assure that such information is available the Administrator may wish to list the substance under such section at the time the assessment process is first begun (if it is not already listed).

There are numerous short-term tests to evaluate the potential adverse human health effects of hazardous air pollutants; however, some of these tests may be limited in scope and validity in terms of human health risk or are expensive to perform. Methods development is currently proceeding within the Agency in the following areas: pulmonary toxicity, neurotoxicity, developmental toxicity (teratogenicity and reproductive effects), immunotoxicity, as well as other target organs; however, the Agency's existing research program in these test methods will likely require expansion and acceleration to allow, within the timeframes prescribed in this paragraph, data from these tests of hazardous and toxic air pollutants to be reasonably extrapolated to human effects.

The provisions of subpargraph (F) of subsection (c)(1) authorize any person to petition the Administrator to list a substance for the promulgation of emissions standards within 3 years or the initiation of an assessment beginning in the following year. The petition shall be granted or denied within 180 days and if granted in substance be added to the appropriate list. To assure that the right of petition does not overwhelm the assessment process, the Administrator is required to initiate no more than seven assessments annually as a result of petitions granted. Assessment of the additional chemicals added to the list through petition may be deferred for commencement in the following years.

Paragraph (2) of subsection (c) requires the Administrator to promulgate emissions standards for all source categories of the pollutant not later than 36 months after the date on which it was listed under this subsection. Under current law, the Administrator is to propose standards within 180 days and promulgate standards not more than 180 days later. That schedule is clearly unworkable. It has never been satisfied in the 17-year history of section 112. to avoid court-ordered standard-setting on a schedule the Agency believes to be too rapid (as happened in the case of radionuclides where Mr. Ruckelshaus faced a contempt of court citation for failing to issue timely standards for a listed pollutant) the Agency has developed a new category of air pollutants—the so-called "intent-to-list" pollutants.

There are now 10 substances on the "intent-to-list" schedule which are pollutants the Agency believes present significant public health threats but for which the Agency is not yet prepared to propose emissions standards. The "intent-to-list" category of pollutants—invented by the Agency to avoid the commitment made to the Congress in November 1983 that decisions on 25 to 35 pollutants would be taken by the end of 1985—is entirely inconsistent with the spirit of section 112. Many of the pollutants on the "intent-to-list" list have been in the regulatory mill for years, are currently regulated by the States or under other EPA programs (the Safe Drinking Water Act, subtitle C of the Solid Waste Disposal Act, the Federal Insecticide, Fungicide and Rodenticide Act, etc.) but have not been addressed under the authorities of section 112 as air pollutants. The "intent-to-list" chemicals symbolize all that is wrong with the Agency's efforts to protect public health from hazardous air pollutants. They make it clear that the Agency has not the will necessary to carry out the law as currently written.

The schedule for promulgating standards is extended from 1 year to 3 years to provide a more reasonable timeframe in which to conduct the investigations and other activities necessary to move from listing an air pollutant to promulgating standards for the emissions sources of such pollutant. A 3-year schedule has in the past been supported by the Agency in testimony before the Congress. The activities undertaken during this period are described across the bottom of the flow chart shown in Figure V. 9. They include review and screening of the source categories, visits to specific plants and facilities, demonstration and monitoring of control technologies and risk assessment and risk management reviews.

The language of paragraph (2) of subsection (c) requires that the Administrator publish standards for all source categories. That has not occurred under current law. For instance, although benzene is one of the most significant hazardous air pollutants from a public health perspective (both because of large emissions and high potency), emissions standards have only been promulgated for one benzene source category—equipment leaks. That standard was promulgated in 1984. In the case of radionuclides the Agency is currently facing a second round of court challenges for its failure to regulate significant source categories. Thus, even when a pollutant is listed emissions standards are actually promulgated, there still may be significant threats of human health from that pollutant at unregulated sources. To address this failing, the language requires the Administrator to establish standards for all source categories. This is a reference to the source categories that are listed by the Administrator at the time the pollutant is listed. The language provides for no quantitative or qualitative distinctions between source categories or authority to exclude a source category from the list. And it explicitly excludes the cost-effectiveness comparisons between source categories which have been forced upon the Agency by the Office of Management and Budget in the past.

Paragraph (2) also contains a clear statement of the public health objective that is to be assured by emissions standards for these pollutants:

> The Administrator shall establish any such emission standard or standards at the level which, in the judgment of the Administrator, provides an ample margin of safety to protect public health, unless a more stringent standard is required to protect the environment . . . No consideration of costs, economic, energy or other factors or technological feasibility shall be included in the determination of

the appropriate level of any emission standard to protect the public health under this subsection.

The phrase "provides an ample margin of safety to protect public health" is taken from current law. It is, by comparison, a more stringent test than is applied to criteria air pollutants where the objective is "an adequate margin of safety to protect public health." Although courts have held that no cost consideration shall enter into the establishment of a National Ambient Air Quality Standard (NAAQS) for a criteria pollutant, in a recent decision (*NRDC* v. *EPA*, 824 F.2d 1146), the Court of Appeals for the D.C. Circuit, addressed the question of cost in establishing NESHAPs for hazardous air pollutants and found that cost considerations may play some role. This holding is not in conformance with current law and an explicit prohibition on cost considerations has been included here to make that clear.

The Court's interpretation of current law postulates a two-step procedure for setting standards. In the first step, the Administrator is to set a "safe" level of exposure considering only the potential adverse health effects of the pollutant. A "safe" level need not, in the Court's view, eliminate all risks. Especially in the case of carcinogens (where there may not be any level of exposure below which adverse effects will not occur), the Court determined that some risk of adverse effects may continue, even after an emissions standard is implemented. (In a more recent decision *(Public Citizen, et al.* v. *Dr. Frank Young,* No. 86–1548) the same Court has described the allowable risk as a de minimus exception.) In the NRDC case the Administrator was invited to select an acceptable level of risk appropriate "for the world in which we live."

As a second step, determining an "ample margin of safety", the Court would allow factors such as cost and feasibility to be considered. Presumably, if it were technologically feasible and affordable for the potentially regulated industry, the Administrator, in his discretion, could establish the emissions standard at a level more stringent than necessary to assure simple "safety."

The Court decision in the NRDC case seriously misreads the statute. "Safety" and "ample margin of safety" are not separate concepts in the law. There is but one standard "ample margin of safety to protect public health" taken all-of-a-piece. Cost considerations, which have been disallowed in determining an "adequate margin of safety" under section 109, are certainly not authorized by the more stringent standard of section 112. It is not likely that Congress would delegate to the Administrator the authority to determine a level of risk acceptable "for the world in which we live" and the Congress specifically did not do so in this instance, insisting as it did on an "ample margin of safety."

In the context of pollutants with adverse health effects other than carcinogencity, the concept of "ample margin of safety" is well understood. Based on a wide variety of studies (animal, clinical, epidemiological) a threshold level of exposure is established below which no adverse health effects will occur. This is the "safe" level. An ample margin of safety is ordinarily two or more orders of magnitude less than the safe threshold of exposure taking into account the sensitivity of subpopulations, the certainty of the data on which the threshold determination was made, the potential interaction with other pollutants, and so on. "Safe" and "ample margin of safety" are different standards of protection and no part of the distinction depends in any way on the cost or feasibility of control technologies.

It is not necessary to abandon this common understanding in the context of carcinogens. The problem in regulating carcinogens is not "ample margin of safety" but "safety" itself as there may be no threshold below which exposure to a carcinogen is safe. Instructing the Administrator to select a level of safety that is acceptable for a carcinogen does not resolve the dilemma of regulating carcinogens (there is no safe level). If one is prepared to abandon the concept of safety (no adverse effect) altogether and move into the realm of acceptable risk (which is perhaps what the Court intended), other standards of protection are available. But no standard of negligible or de minimis or acceptable risk is currently authorized by law for hazardous air pollutants.

If the Agency believes that "ample margin of safety" is not an appropriate standard of protection for the regulation of carcinogens (some of which are now ubiquitous in the human environment), then it is free to seek modification of the statutory standard. It has not. Furthermore, it was not necessary for the Court to torture the plain meaning of the statute to resolve the case discussed here. The Agency's decision at issue in *NRDC* v. *EPA* (824 F.2d 1146) was reversed in any event, an outcome that could have been reached without the two-step, and novel, interpretation of "ample margin of safety." To make the meaning of the statutory language absolutely certain a sentence disallowing any cost or feasibility considerations in setting the standard is added by this legislation. This addition simply confirms the intent of current law.

There will continue to be pollutants (including carcinogens) and source categories for which an emissions standard providing an ample margin of safety to protect public health is appropriate. But the bill provides two other regimes which may be used as an alternative. First, the Administrator is directed to establish technology-based standards for a large number of pollutants under subsection (b). Second (and if technology-based standards provide insufficient protection and health-based standards are required), the Administrator may, in the case of pollutants which are probable or possible human carcinogens, set an interim emissions standard which provides other than an ample margin of safety, but only if that standard will reduce the risk of excess cancer to the persons most exposed to a level of one in one million or less. This second option, set forth in paragraph (2)(C) of subsection (c), allows the Agency to use the risk assessment-risk management approach in the regulation of hazardous air pollutants which are carcinogenic and represents a substantial departure from current law. As such, it is hedged with several safeguards.

First, the alternative standard is to be set on an interim basis effective for only 5 years, after which it must be reviewed to determine whether an ample margin of safety can then be provided (as a result of innovation in control technology or the substitution of new, less hazardous substances). Second, it can only be applied in the case of probable and possible human carcinogens (Class B and

C carcinogens). And third, the individual facility which operates under an emissions standard of this type must be added to the list of sources subject to the "high-risk point source review" program conducted pursuant to subsection (e) by the State in which the facility is located. Under this program, persons living near the facility will be notified of the risks which the emissions present and there will be an opportunity for a public hearing to share information and discuss the measures which might be taken to further reduce risks to public health.

These provisions employ the concepts of risk assessment and risk management in a limited set of circumstances for the regulation of harmful air pollutants. The level of risk considered acceptable here—one in one million—is traditional in government decisions of this type. It is currently used in the pesticide programs of the Agency. It was recently endorsed as an acceptable risk level by the National Academy of Sciences in a report on pesticide residues in food.

Recognizing the very uneven distribution of risk presented by air toxics—some are exposed to very high risks (in the range of one in one hundred) while much of the population experiences only low exposures—and the tendency of the Agency to discount the threat of adverse health effects to small populations, the bill requires that the protection afforded by this alternative standard be determined from the perspective of the most exposed individual, rather than according to annual cancer incidence across the whole population.

The analytical procedures, called the risk assessment, that lead up to a determination of the risk of excess cancer for the most exposed individual as the result of exposure to an air pollutant are complex and controversial. In September, 1986, the Agency published a series of guidelines on risk assessment to clarify the methods and procedaures which it will follow in making those determinations. These guidelines are referenced in paragraph (2)(C) as an appropriate foundation for emissions standards established under this section. The current method are conservative, especially with respect to assumptions on the exposure of the potentially most exposed person from point sources. Recognizing that risk assessment is a new science undergoing rapid development, it is not the intention of the legislative language to prohibit modification of the risk assessment procedures outlined in the 1988 guidelines, but neither is it expected that the fundamental inferences of the risk assessment guidelines will be altered radically as the result of their use to implement the provisions of this paragraph. In particular, the conservatism included in the guidelines to account for uncertainty should be maintained.

The amendment to section 112(c) require the Administrator to regulate air pollutants which cause significant adverse effects to the environment. This provision is adopted out of concern for the growing impact caused by pollutants transported over long distances and deposited on sensitive resources. Air toxics are becoming a principal source of non-point pollution in the Nation's surface waters. For instance, 80 percent of the toxic substances detectable in the waters of Lake Superior are attributed to air deposition. Recent studies show that airborne fallout is a significant source of polynuclear aromatic hydrocarbons (PAHs), chlorinated hydrocarbons, pesticides, heavy metals, dioxins, and furans in the Great Lakes and other regions. Evidence indicates that airborne toxic chemicals are also contributing to growing numbers of significant adverse effects on the environment, including tumors and lesions found in a variety of fish species and high levels of birth defects and reduced hatch rates among birds in the biological food chain of the Great Lakes fishery.

A significant environmental effect is one which causes a measurable change in biological activity over a broad areas, a substantial degree of damage in a localized area, a potential threat to an undangered species or protected resource, or a measureable change in the physical or chemical characteristics of a natural resource. Natural resource is to be broadly defined to include surface and ground water supplies, forests, crops, climate and the atmosphere. Cost considerations may be taken into account when setting standards to protect environmental values. Although this report uses the phrase "health-based standard" throughout when referring to regulations promulgated under subsection (c), in each instance this is understood to include those standards which are promulgated to protect environmental values.

Health-based emissions standards promulgated under subsection (c) shall be effective on the date of promulgation and, with respect to new sources, shall be applicable to all such sources which began construction or modification at any time after the standards were first proposed. As provided in subsection (d), these emissions standards are to be implemented through the issuance of permits, to both new and existing sources, either by the Agency or by a State acting pursuant to a program approved under subsection (e).

The legislation preserves a provision of existing law authorizing the Administrator to publish information on the control technologies which would be effective in meeting the standards and which represent significant gains in efficincy or cost effectiveness over current practices in the regulated industries. Perhaps because the standards have been so few in this area, insufficient guidance has been provided under this authority in years past.

Compliance Schedules

SUMMARY

The bill amends subsection (c) of section 112 of the Clean Air Act (redesignated as subsection (d) by these amendments) which includes prohibitions of the construction or operation of faciliites which violate the emissions standards for air pollutants which are or would be applicable to such facilities. These prohibitions are essential to the enforcement of section 112. The subsection also provides the Administrator with authority to defer the compliance date (beyond the effective date of the standard) for existing sources, both in general and with respect to specific facilities, where necessary to allow time for the acquisition and installation of control technology. The amendments contained in the bill prohibit the construction of new sources unless they will be in compliance with applicable health-based or technology-based standards. The amendments also provide authority for the Administrator to grant extended periods before compliance with health-based standards is required of existing sources conditioned on the nature of the pollutant emitted, the economic effect of full compliance and other measures that may be required in the interim.

The amendments made by this bill also include a general statement of policy indicating that emissions standards promulgated under section 112 (including both technology-based standards for major sources and health-based standards for stationary sources) shall be implemented through the issuance of permits to new and existing sources.

DISCUSSION

Subsection (c) of section 112 in current law establishes compliance schedules for sources subject to a NESHAP (national emissions standard for hazardous air pollutants). New sources may not be constructed and existing sources may not be modified (as defined by the Agency under the current section 111, modification means any change in the facility that increases emissions) after the effective date of the NESHAP, unless the Administrator finds that the new or modified facility will not violate the standard. In practice, this "finding" requirement has been satisfied through the issuance of State permits to new and modified sources.

In addition, current law requires that all existing sources (those constructed before the NESHAP was proposed) subject to a NESHAP be in compliance with the emissions standard with 90 days. The Administrator may grant a 2-year waiver for a specific facility before compliance is required. It is uncertain as to how this compliance schedule for existing sources has been implemented in practice, as EPA has generally delegated NESHAP enforcement to the States. The Agency assumes that the States have most often granted 2-year waivers, but keep no records to verify this assumption.

Finally, current law allows the President to exempt a source from compliance with a NESHAP for a period of up to 2 years, if the technology to meet the standard is not available and operation of the source is in the national security interest of the United States. The Committee is not aware of any occasion on which this exemption has been used, but it is preserved without amendment in the new section 112.

Section 504 of the bill includes several amendments with respect to compliance schedules in the (redesignated) subsection (d). As with current law, sources may not be constructed or modified after the effective date of a standard (the date of promulgation) unless compliance with the standard is assured. And "new sources" is defined to include all facilities subject to a standard, the construction or modification of which is commenced after the standard is first proposed. This prohibition will now apply to both the health-based standards issued under subsection (c) and the technology-based standards authorized by subsection (b). As with current law, the Administrator (or a State acting under a program approved pursuant to subsection (e)) must "find" that the proposed new or modified source will be in compliance. This implies that a permit must be issued before construction or modification occurs. The permit must specify requirements for the proper operation of such source to assure that compliance will be maintained.

In respect to existing sources, the policy for compliance schedules is divided into two parts, one for technology-based standards under subsection (b) and a different scheule for existing sources subject to health-based standards issued under subsection (c).

For technology-based standards, the Administrator is to establish a compliance schedule which is as expeditious as is practicable, but which may provide for a period of up to 3 years for existing sources to meet the standard. Beyond this date (three years after the date the standard is promulgated) a particular existing source may receive an additional 2-year waiver, if such period is necessary for the installation of controls and no imminent endangerment to the health of persons is caused or may be caused by the source. The Administrator shall provide guidance to EPA regional administrators and the States on the conditions and circumstances which would define the presence of an imminent endangerment to public health.

Paragraph (5) of the new subsection (b) allows an extended period of time for sources which have installed control technology to satisfy the requirements of part C (prevention of significant deterioration) or D (non-attainment) of the Clean Air Act to come into compliance with the more stringent technology-based standards under this section. The 5-year extension provided there shall not be in addition to the compliance periods for categories and specific sources provided here, but shall run concurrently and not extend beyond 5-years after such controls were installed.

For existing sources subject to health-based standards, a prohibition on emission in excess of the standard also applies, except that the schedule for compliance with a standard for a carcinogenic air pollutant (or other non-threshold pollutant) is extended predicated on the presence of extraordinary economic costs and the implementation of other measures to protect public health. For both threshold pollutants (those for which exposure below an identifiable level is not expected to produce adverse effects) and non-threshold pollutants, the basic policy requires the Admnistrator to establish a compliance schedule which is as expeditious as is practicable but which may provide for a period of up to two years for installation of the necessary control technologies and practices. Considering the serious adverse health and environmental effects of an air pollutant which make promulgation of health-based standards necessary, no waiver beyond this two-year period is possible except in the case of a standard for a non-threshold pollutant (principally, carcinogens), where, on a source-specific basis, the Administrator may grant a waiver from compliance for a period of up to 8 years provided that the owners or operators make a showing that each of the following conditions are met—

(1) compliance with the standard would impose extraordinary economic hardship on the source, that is, costs for the source are wholly disproportionate to costs imposed on other sources of a similar type and size;

(2) the source will comply with an alternative emission limitation which reflects the standard that would have been im-

posed pursuant to subsection (b)(3), that is, a technology-based emissions standard; and

(3) during the period of the waiver continuous progress will be made toward compliance with the applicable health-based standard under subsection (c).

This waiver for extraordinary circumstances is allowed in recognition of the basic dilemma in regulating air pollutants which are known or suspected carcinogens. Because there may be no "threshold" level of exposure to a carcinogen below which there are no health effects, assuring an "ample margin of safety to protect public health" or in the alternative (for probable and possible carcinogens only) a risk of excess cancers not greater than one in one million may require very stringent emissions standards for these pollutants—standards which may impose significant costs on existing sources including shutdown orders in some instances. To allow for the appropriate and more frequent use of this authority, this extended compliance period is made available to mitigate some portion of the economic effect.

The statutory language allows the Administrator to grant an extended period for compliance of up to 8 years for a category or subcategory of sources. Considering that an extension is on the condition that continuous progress toward achieving the health-based standard will be achieved, individual sources will only be granted extended compliance schedules as part of a categorical waiver to the extent that they can show extraordinary economic effects as the result of compliance with the standard at that specific source.

Finally, the amendments made to subsection (d) explicitly require that emissions standards, both technology-based standards under subsection (b) and health-based standards under subsection (c), for new and existing sources are to be implemented through permits issued either by the Administrator or by a State operating under a program approved pursuant to subsection (e). In the case of new or modified sources these permits will be required before construction or modification is commenced (as provided by subsection (d)(1)(A)) and in the case of existing sources not later than the compliance date which applies to the category as a whole. Waivers of the compliance date granted to specific sources should be implemented through permits issued before the date on which compliance would otherwise be required.

Permits for sources may anticipate frequent modification of processes and points of emission (as may occur in the pharmaceutical industry) without separate application for each modification, but only if the permits assure proper operation of the facility so that standards will not be exceeded and the other provisions of subparagraph (A) are met. Although single permits may cover multiple points of emissions within one facility, the permits must contain specific, enforceable emissions limitations for each stationary source within the facility to which standards are applicable.

With respect to permit terms, clauses for reopening a permit, public participation, EPA oversight and other aspects of a permit program, the legislation provides discretion to the Administrator. It should be noted that the NPDES program operated under the Clean Water Act has proved successful in the control of effluent from industrial point sources implementing technology-based standards not unlike those authorized here and the NPDES program may serve as an appropriate model to establish these requirements.

State Programs

SUMMARY

The bill amends subsection (d) of section 112 of the Clean Air Act (redesignated as subsection (e) by these amendments) and is intended to significantly expand the statutory role of State and local air pollution control agencies in the regulation of air toxics. This section also amends section 105 of the Act to authorize grants to State and local air pollution control agencies to address the air toxics problem.

The bill would authorize State and local air pollution control agencies to submit proposed programs to implement and enforce the emissions standards for air toxics established by the Agency under the modified section 112 and to prevent and mitigate the accidental release of extremely hazardous substances. The Agency will provide guidance to the State on the elements to be included in these proposed programs. At a minimum the programs must: (1) include permit requirements for all sources within the State subject to technology-based or health-based emissions standards; and (2) provide for the registration of all facilities handling extremely hazardous substances in more than threshold amounts. State programs will also include provisions for the review of point sources of air toxics emissions which present especially significant risks to those residing or working within the vicinity of the source.

The national air toxics clearinghouse already established and operated by the Agency is specifically authorized.

The Administrator is given authority to make grants to the States to support both: (1) the implementation and enforcement of the program and standards established by the Agency pursuant to the amended section 112; and (2) other, complementary but not specifically authorized activities, conducted by the States which are intended to protect public health and environment from the effects of toxic air pollutants. $35 million for each of the fiscal years from 1988 through 1992 is authorized to support State programs.

The programs submitted by the States are to be reviewed by the Administrator and are to be approved or disapproved based on statutory criteria. Programs disapproved may be resubmitted after modification to take account of the concerns expressed by the Administrator. After a program is approved, the Administrator shall withdraw approval, if the State fails to carry out the program as required and does not take corrective action within 90 days of notification of such failures by the Agency.

DISCUSSION

Section 505 provides authority for States (and local pollution control agencies) to submit programs for the implementation and enforcement of emissions standards issued under subsections (b) or (c) and the prevention and mitigation of accidental releases of extremely hazardous substances as provided in subsection (g). These authorities will greatly expand the role of State and local pollution control agencies in the statutory programs to protect public health and the environment from the release (whether routinely or by accident) of toxic air pollutants. Under current law, the State role is limited to the enforcement of the handful of emissions standards which the Agency has promulgated for hazardous air pollutants.

In actual practice, a few State and local governments have taken a far more wide-ranging role, both on their own and in partnership with the Environmental Protection Agency. Building the capacity of State and local air programs to control the emission of toxic air pollutants was a principal focus of the Agency's 1985 air toxics strategy.

A fundamental element of the programs to be submitted for approval under the new provisions, as with current law, is to enforce compliance with emissions standards promulgated by the Federal government. Documents from the Agency indicate that 43 "States" have taken delegation for the enforcement of all NESHAPs, 12 have delegation activities underway, 3 have delegation for all standards except asbestos and 5 show that NESHAPS are not applicable to facilities in the State. This level of delegation reflects significant success in recent efforts to develop this element of State programs. Of course, enforcement and implementation activities delegated under the program as modified by this legislation will also encourage comparable activity by the States for the technology-based standards issued pursuant to subsection (b) and the accident prevention and mitigation requirements which may be promulgated under subsection (g).

The modified subsection (e) provides for either complete or partial delegation of the Federal enforcement and implementation responsibilities. Partial delegation may entail only health-based standards, only emissions standards (both technology-based and health-based), or only the accident prevention and mitigation program. The Agency shall not approve State programs that cover only some types of facilities or some pollutants within a larger area of activity.

This legislation does not authorize the Agency to "refer" toxic air pollutants to the States for the development of emissions standards and control programs as was proposed by the Agency in the case of acrylonitrile. Title V is based on S. 1384, a bill introduced in the 100th Congress by several members of the Committee. That legislation did provide for a State role in the standard-setting process and included the following language:

> The guidance shall specify the procedures and standards to be used in establishing emissions standards for hazardous air pollutants, toxic air pollutants and other regulations and requirements applicable to sources of such pollutants and to facilities which have the potential to emit extremely hazardous air pollutants . . . The Administrator shall not approve a State program or partial program that would establish a standard, regulation or requirement applicable to a source or category of sources of toxic or hazardous air pollutants or to a facility which produces, processes, handles or stores an extremely hazardous substance

> which is less stringent than a standard, regulation, or requirement issued by the Administrator under this section . . .

By specifically deleting this language from the reported bill, the Committee has made clear its disapproval of a policy that relies upon State or local pollution control agencies to set emissions standards for toxic air pollutants. In the case of acrylonitrile, which is routinely emitted by 25 facilities in 14 States producing substantial individual risks in local areas, the Administrator sought to avoid the need for a Federal NESHAP by referring this problem to the States where the emitting facilities were located. It is not clear from the record before the Committee what action the States have taken to reduce emissions of acrylonitrile, but the referral process has been deleted by the Agency from its air toxics strategy (for lack of support at the State level) and is explicitly rejected by this legislation. Acrylonitrile is listed among the 11 high-priority pollutants for which technology-based standards are to be promulgated by the Administrator within 18 months of enactment.

The policy reflected here does not preclude a State from developing emissions standards for air pollutants or requirements to prevent releases of extremely hazardous substances not addressed by the Federal program. Federal funds may even be used to develop these standards and requirements. However, the Agency is not to avoid its responsibility to protect public health and the environment by referring substances of concern to States for regulation, nor is it to require standards for a particular pollutant as a precondition of funding. Where a pollutant meets the criteria for listing and control under subsections (b) or (c), the Administrator—and not the State—will fulfill the mandate in the law.

The Administrator is required to issue guidance on the development and implementation of State air toxics programs within 12 months of the date of enactment of this legislation. The Agency has provided preliminary guidance of this type in the following documents:

> "Technical Assistance for FY 1986 State and Local (S/L) Air Toxics Program Development", November 26, 1985.
>
> "Guidance for Preparing State and Local (S/L) Multiyear Development Programs for Air Toxics", August 5, 1986.
>
> "Review of FY 1987 Multiyear Development Plans", June 9, 1987.

These documents provide an adequate foundation for the formal guidance to be issued by the Administrator within 12 months of enactment.

The 1985 technical assistance document was focused on the preparation of multi-year development plans with 2- to 5-year planning horizons and meaningful milestones to measure progress. Emphasis in this document was placed on participation in the air toxics clearinghouse activities, developing adequate staff resources, demonstration projects for evaluation of "nontraditional sources" of air toxics emissions, and information exchange.

The 1986 document established four major themes and a minimum level of effort appropriate for all State and local air toxics programs. These elements, set out in Figure V. 10., will form a partial foundation for the guidance issued by the Administrator to implement the new subsection (e) of section 112.

FIGURE V. 10.

Major Themes: 1986 Guidance for State Programs

Theme (in decreasing priority)	Minimum Activity
(1) NESHAP	--no minimum (delegation and enforcement of any applicable NESHAP)
(2) Building S/L capabilities	--identify program coordinator --provide capability to perform initial air toxics screening procedures --research legal authority --develop general toxics emissions inventory --participate in national workshops
(3) High-Risk Point Sources	--initiate/implement screening procedure for reasonable number of candidate point sources --explore possibilities for integrating air toxics concerns into existing new source review procedures
(4) High-Risk Urban Problems	--identify candidate urban areas --develop work plan for data collection/analyisis --incorporate air toxics concerns within related SIP data collection activities --initiate data collection

As the figure indicates the activities identified constitute a minimum level of effort in the earliest phases of State and local air toxic program development. As programs mature, guidance issued by the Administrator will include additional milestones reflecting progress in addressing the air toxics problem. In addition, modifications to these themes and activities will need to be made to reflect the program authorized by this legislation.

Delegation of "NESHAP" enforcement will, of course, include implementation and enforcement of both the technology-based standards issued under subsection (b) and the health-based standards issued under subsection (c).

The high-risk point source review program is specifically authorized by the bill and is discussed below.

Integration of the air toxics program with new source review programs implmenting part C and part D of the Act is a high priority. In addition, when revising SIPs for non-attainment areas State and local agencies are to consider the toxic character of pollutants emitted from existing facilities subject to requirements for "reasonably available control technology" as provided in amendments to section 171 of the Clean Air Act made by Title I of this legislation.

The objective of the "high-risk urban problem" element of State programs is to evaluate and mitigate the urban "soup" of air toxics which has been shown to pose the potential for high lifetime risks. These high risks do not appear to be related to specific point sources, but instead result from the complex pollutant mixtures typical of urban air. Recent ambient monitoring data for 10 to 15 toxic pollutants in five major urban areas suggest that lifetime aggregate individual risks of excess cancer in the range of one in one thousand may be commonplace in large urban areas. The 1986 guidance document establishes a goal of conducting high-risk urban assessment and mitigation programs for the 29 urban areas with population in excess of 1 million persons. In addition, programs focusing on areas with lesser populations, but concentrated industrial activity or sensitive environmental resources may also be appropriate.

Elements of the work plan for a typical high-risk urban assessment and mitigation program would include collection and analysis of air quality data, compilation of an areawide emissions inventory for selected pollutants, dispersion model analysis and risk assessment. It is not intended that these urban programs be research projects. They are to lead to the implementation of control strategies to protect public health and the environment.

The guidance issued by the Administrator will stress two additional themes: (1) the issuance of permits to all stationary sources subject to an emissions standard under either subsection (b) or (c) of section 112; and (2) the registration of all facilities handling extremely hazardous substances listed pursuant to subsection (g) in more than the threshold quantities. Although the legislation does not provide detailed direction on the structure of the permit program, the NPDES program implemented under the Clean Water Act would be an appropriate model. In the absence of State permits, facilities subject to emissions standards under section 112 will require a permit issued by the Agency.

The guidance must also make provision for the development of "accident release" programs at the State level. In particular, the following policy announced in the 1986 guidance document, is reversed by this legislation:

> Although there is considerable interest in the accident prevention capabilities of an air toxics program, guidance development for this activity is currently not within the jurisdiction of EPA air programs. Consequently, we recommend that you not place a high priority on initiating new activity in this area . . . at the expense of developing a reasonable program to control routine emissions.

As reflected in the new subsection (g), accident prevention capabilities will be a high priority in the air toxics program and as a minimum each State must include in its proposed program an element providing for the registration of facilities handling extremely hazardous substances in more than threshold quantities as listed pursuant to subsection (g). The State of New Jersey has developed a thorough registration program of this type pursuant to its Toxic Catastrophe Prevention Act which should be used as a model to develop the guidance required by this section.

As noted above, the guidance documents already issued by the Agency include the review of high-risk point sources as one of the four basic themes of State and local air toxics programs. Section 505 specifically requires that each State program, which is approved under the new subsection (e) and for which grants are made, include a program for the review of high-risk point sources. The program element established by the legislation modifies in some respects the guidance which has been issued.

In the process of screening pollutants and sources for the promulgation of NESHAPs, the Agency has done risk assessments on approximately 2650 point sources of air toxics. At about 23 percent of these facilities there is a "hotspot" within the vicinity of the facility posing a lifetime cancer risk in excess of 1-in-10,000, considered a relatively high risk compared to other threats from environmental pollution. The Agency's acceptable risk range in other programs like Superfund, for instance, is generally in the range from 1-in-10,000,000. Said another way, if the approximately 700 facilities presenting air pollution risks of 1-in-10,000 or greater were abandoned waste dumps, they would be candidates for cleanup under the Nation's Superfund law.

In light of these comparisons, the Agency guidance for State and local air toxics programs has encouraged review of high-risk sources in the absence (or in advance) of federally-promulgated NESHAPs. The Agency has specifically promoted review with respect to the 22 facilities listed in Figure V.11. during the last two fiscal years.

FIGURE V. 11.

PROMOTED INITIATIVES - 1986 AND 1987

SOURCE	CITY/STATE	CHEMICAL[a]	BASELINE MAXIMUM INDIVIDUAL CANCER RISK
Hooker Chemical	Niagara Falls, NY	HCCPD	b
First Mississippi	Pascagoula, MS	Benzene	3.1×10^{-10}
Diamond Shamrock	Castle Hayne, NC	Hexavalent Chromium	2.5×10^{-3}
Macalloy	Charleston, SC	Hexavalent Chromium	1.7×10^{-3}
Velsicol	Memphis, TN	HCCPD	b
Velsicol	Marshall, IL	HCCPD	b
Indiana Glass	Dunkirk, IN	Arsenic	9.0×10^{-4}
Owens-Illinois	Toledo, OH	Arsenic	2.3×10^{-4}
American Chrome and Chemicals	Corpus Christi, TX	Hexavalent Chromium	2.0×10^{-3}
ASARCo	E. Helena, MT	Arsenic	2.0×10^{-3}
General Electric	Pittsfield, MA	MC	2.1×10^{-4}
Vista	Baltimore, MD	Benzene	2.1×10^{-4}
N.J. Zinc	Palmerton, NJ	Arsenic	1.2×10^{-2}
LCP	Moundsville, WV	CT,MC,CF	1.4×10^{-3}
PPG	Natrium, WV	Benzene	1.3×10^{-4}
Merck	Albany, GA	MC	1.2×10^{-3}
Burroughs Wellcome	Greenville, NC	MC	7.6×10^{-4}
General Electric	Mt. Vernon, IN	MC	2.0×10^{-3}
Dow Chemical	OPlaquemine, LA	CT,PCE,MC,CF	1.1×10^{-3}
ASARCo	Denver, CO	Cadmium	1.4×10^{-3}
Dow Chemical	Pittsburg, CA	CT,PCE	2.1×10^{-4}
Diamond Shamrock	Pasadena, TX	CF,EDC	9.2×10^{-4}

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a. MC = Methylene chloride; CT = Carbon tetrachloride; CF = Chloroform; PCE = Perchloroethylene; EDC = Ethylene dichloride
HCCPD = Hexachlorocyclopentadiene

b. Based on noncancer health effect

To date federally-promoted initiatives have focused on the development of State capacity to conduct source-specific screening comparable to that conducted by the Agency during the development of a NESHAP and intergration of this review program with other activities by the State with respect to the same source under section 110 or part C or D of the Clean Air Act. This developing State capacity is supported by this legislation and is used as a foundation for two additional elements, notification and public hearings.

States are to notify persons living or working in the vicinity of high-risk point sources through general circulation newspapers and other media of the risks presented by the source. This notification shall also include the oportunity for a public hearing near the location of the high-risk facility should it be requested. Pollutants emitted from such facilities may be transported over substantial distances. For instance, arsenic emissions from a smelter in Tacoma, Washington have a noticeable impact on soil samples taken from sites more than 20 kilometers away. Notification over wide geographic areas is, thus, appropriate. Other channels for communicating the risks presented by such facilities may include State regulatory bulletins and public service announcements aired over electronic media. The notification will make clear that the opportunity for a hearing is available should members of the public make the request. Hearings are only required, if requested by the public.

The purpose of the hearing is to: 1) present detailed information on the emissions from the facility and the potential adverse health and environmental effects which may result; 2) to provide information on the programs of the State or local government which may be available to control emissions; and 3) to answer inquiries from the general public with respect to the facility, its emissions, and the consequent risks. To the extent that the hearing would required by other provisions of Federal or State law, one proceeding should be undertaken to satisfy all requirements.

To facilitate identification of high-risk point sources and the notification of potentially affected persons, EPA is to publish in the Federal Register a list of point sources of toxic air pollutants (whether the pollutants of concern are listed pursuant to this section or not) known to the Agency as high-risk sources. High-risk in this context shall be determined by the Administrator, but risks comparable to those noted in the above table for the promoted initiatives over the past two fiscal years are within the range of concern. As an initial list of such sources, EPA will use those sources listed in Table 19 of the NATICH data base for July, 1986. There is no requirement in the legislation that the Agency conduct a separate screening program for this purpose, but it shall continue to review and revise the list of high-risk point sources based on information which becomes available during the conduct of other activities. All known sources of this type shall be listed and the list shall be modified at least every 3 years.

Information which becomes available to the Agency is generally developed in the screening of sources during the development of NESHAPs. This connection to developing Federal regulatory efforts should not discourage States from taking aggressive action to reduce the risks identified. More than one-half of the pollutant screenings conducted by the Agency have not led to actual

NESHAP promulgation (despite some very high-risk hotspots) and in those cases where regulations have resulted or are proposed, the timeframe from screening to promulgation and compliance has been unduly extended. The requirement for a high-risk point source review program does not in any way diminish the Administrator's responsibility to list and set standards for pollutants that meet the criteria for listing under subsections (b) or (c).

Although States are not required by the legislation to conduct independent screening programs for high-risk point sources, efforts along these lines developed by progressive milestones through the Administrator's guidance would be appropriate. There is no specific deadline or schedule in the bill for completing State review of all high-risk point sources listed by the Agency. It is expected that the pace of review will be accelerated will beyond the pace indicated by the 22 items promoted in fiscal years 1986 and 1987 and that reviews for all listed sources will be completed during the period for which grants are authorized (fiscal year 1988 through 1992).

The bill establishes the National Air Toxics Information Clearinghouse which was inaugurated by the Agency in 1985 to support State and local programs in the control of non-criteria air pollutants. The Clearinghouse is intended to facilitate information exchange among State and local agencies, between EPA and State and local agencies, and to minimize duplication of effort. The Clearinghouse gathers and provides technical information to the States and consists of an on-line computerized data base (NATICH) which contains information on potentially toxic air pollutants, hard copy reports of information from the data base, several special reports, and a quarterly newsletter. Users (generally State and local pollution control agencies) can directly query the data base or, if compatible equipment is not available, can obtain further assistance through EPA regional offices. The data base includes State and local contacts, acceptable ambient concentrations and standards, research information, permitting information, monitoring information, emissions inventories, source-specific risk assessments, and bibliographic information.

The Administrator is authorized to make grants to State and local air pollution control agencies to support the development and implementation of air toxics control and accident prevention and mitigation programs. In general, these grants will support activities described in the guidance and conducted in support of the Federal program. However, Federal funds may be used by the States to address air pollutants, emitted both routinely or through accidental events, not subject to control under the Federal program established by subsections (b), (c) or (g).

The Administrator is to review and either approve or disapprove a State or local program within 180 days of submittal. During the 180-day review period, the Administrator is to provide notice that an approval determination is pending and is to seek public comment on the proposed State program. To the maximum extent practicable, the Administrator should through guidance encourage public participation in the development of State programs before submission. The legislation specifies a series of conditions which will warrant disapproval of the State program: (1) the program does not assure compliance by all facilities in the State with standards and requirements issued under subsections (b), (c) and (g); (2) adequate authority or resources do not exist to implement all elements of the program, including those specified in the Administrator's guidance; (3) the schedule for compliance by sources subject to standards and requirements is not sufficiently expeditious; or (4) the program is not in compliance with the guidance established by the Administrator or other ojbectives of section 112.

If the Administrator disapproves a State program he is to notify the State of the modifications which would be necessary to secure approval. A State may then modify the program and resubmit it for consideration in the same manner as originally obtained.

If subsequent to approval, the Administrator should determine that a State is not adequately implementing a program, the Administrator shall withdraw approval. Withdrawal may result when a State does not comply with guidance issued by the Administrator or when a State, subsequent to approval, fails one of the four criteria of paragraph (5) which would initially have led to disapproval. Withdrawal may only be executed after the State has been notified of the deficiencies in writing and a public hearing on the State program has been held. A State has 90 days from the date of the notice of deficiencies to make corrective actions and avoid a withdrawal determination.

Paragraph (7) of this subsection maintains a provision of current law. No decision to approve a State program or delegate enforcement authorities would bar the Administrator from taking an enforcement action against a source violating an emission standard (whether a technology-based standard under subsection (b) or a health-based standard under subsection (c)) promulgated pursuant to these authorities. The absence of a parallel savings clause for the enforcement of accident prevention requirements is not to imply that the Administrator lacks authority to take enforcement actions with respect to facilities in States which have been delegated accident prevention implementation and enforcement responsibilities. It is also to be noted that the Environmental Protection Agency carries the full responsibility to enforce compliance with standards and requirements in those States without an approved program.

Subsection (b) of section 505 of the bill amends section 105 of the Clean Air Act to provide a specific authorization of grants to State and local pollution control agencies for the purpose of developing and implementing air toxics programs. The amount authorized is $35,000,000 in each of the fiscal years from fiscal year 1988 through fiscal year 1992. Currently the Agency provides $95,000,000 in each fiscal year to support the air programs of the States of which approximately $10,000,000 is earmarked for work on air toxics. The amounts authorized in the new subparagraph (D) for air toxics are in addition to amounts that would otherwise be available to support general air programs. Federal funds may be used both to develop and to implement State programs, with Federal funds providing up to two-thirds of the cost of planning, developing, establishing or improving programs and one-half of the cost of maintaining programs. These funds are available to carry out all aspects of the air toxics program including enforcement and implementation of technology-based and health-based emissions standards, prevention and mitigation of accidental releases, high-risk point source review, high-risk urban area programs, and the control of air pollutants not otherwise addressed by Federal programs.

WORK PRACTICES

SUMMARY

The bill amends subsection (f) of section 112 of the Clean Air Act with respect to the promulgation of design standards or work practice requirements that may be used in lieu of emissions standards. The purpose of the amendment is to assure that these authorities (which may be used as alternatives to emissions standards) are available, not only for the health-based standards as authorized by current law, but also for the technology-based standards applicable to major sources as authorized by new subsection (b)(3) and to meet the area source reduction objectives of subsection (b)(7).

DISCUSSION

Generally, the requirements of section 112 of the Clean Air Act, both current law and as amended by the bill, are implemented by the promulgation of numerical emissions standards applicable to point sources of release (such as stacks, vents, pipes, etc.) from stationary sources of the listed air pollutants. However, in some cases regulation in this form would not be effective or appropriate for significant source categories. For instance, emissions of asbestos fibers from construction or demolition sites cannot be controlled or even measured by focusing on a point source of emissions. To assure that adequate control is, nevertheless, achieved, it is in some cases possible to prescribe the use of specific equipment or procedures in the design of a facility or conduct of an activity. In the 1977 amendments to the Clean Air Act (and specifically in response to a court case nullifying regulations for the non-point release of asbestos fibers because the requirements were not expressed as emissions standards), the Congress authorized the use of other regulatory requirements including design, equipment, work practice or operational standards as an alternative to emissions standards to carry out the objectives of section 112.

The purpose of the amendments in the new subsection (f) is to assure that these alternative forms of control are available to the Agency as it implements the new authority to set technology-based standards for major sources and to achieve the objective of a nationwide 55 percent reduction in area source emissions within 10 years. As under current law, the Administrator may set design, equipment, work practice, or operational standards in lieu of an emission standard only when the later is "not feasible" as defined in paragraph (2). In determining whether an emission standard is "not feasible" the Administrator may not consider any factor other than those specifically provided in paragraph (2).

The current law reference to "hazardous air pollutants" (which only includes those pollutants listed under subsection (c)) is modified to include all air pollutants listed under either subsections (b) or (c). The authority to establish alternative requirements which will "protect public health from such pollutant or pollutants with an ample margin of safety" (the standard of protection for health-based regulation) is modified. The amendment adds authority to use these alternative control measures to achieve the degree of protection required by the new subsection (b)(3) which describes the degree of control to be incorporated in technology-based standards for major sources. Finally, current law is amended to make the design standards and work practice authorities of subsection (f) available to the Administrator for use in meeting the objective of subsection (b)(7) which provides for a 55 percent reduction in the inventory of emissions from area sources over a 10-year period.

Prevention of Sudden, Catastrophic Releases

SUMMARY

The bill adds a new subsection (g) to section 112 of the Clean Air Act to establish programs and requirements to prevent the accidental release to the air of extremely hazardous substances and to mitigate the consequences of such releases when they do occur. These authorities are to be coordinated with other accident prevention responsibilities assigned to the Agency, most especially, the programs established by the Emergency Planning and Community Right-to-Know Act of 1986.

The new subsection (g) addresses substances which, when released into the air in significant quantities, may, even in periods of limited exposure, cause death or illness. The objective of the programs established under this section is to prevent the release of such substances (altogether in most cases, but in all cases in amounts that may be extremely hazardous). The responsibility to prevent releases of these extremely hazardous substances is the general duty of the owners and operators of facilities producing, processing, handling or storing such substances, whether or not explicit requirements have been imposed under this subsection or other authorities.

Some of the requirements imposed by the section are only applicable to those facilities handling a substance or substances specifically listed by the Administrator under paragraph (2) of this new subsection. The statute establishes an initial list of 55 extremely hazardous substances. The Administrator is to add substances to this list as necessary to carry out the goals and objectives of this subsection and the Act. A threshold quantity is to be established for each substance at the time of listing.

The owner or operator of each facility at which any one of the extremely hazardous substances listed pursuant to paragraph (2) is present in more than threshold quantities is required to: (1) register with its State or local pollution control agency, if the State is operating under an EPA approved program (as provided in subsection (e)); and (2) conduct a hazard assessment to determine the likely consequences of an accidental release of the substance from the facility. The bill provides definition for the hazard assessment process.

The bill establishes a new entity, the Chemical Safety and Hazards Investigations Board, within the Environmental Protection Agency. This five-member board with an annual authorization of $25 million is to investigate and report on accidents involving death, serious injury or substantial property damage which result from chemical production, processing, handling or storage. The Board is modeled on the authorities of the National Transportation Safety Board which investigates fatal accidents in the transportation sector (airline, railroad, pipeline, highway and marine accidents). The Board has the power to compel testimony and inspect facilities in the conduct of its investigations. The Board, upon the request of EPA or other Federal Government health or safety agency, will conduct investigations of other chemical hazards or potential hazards whether or not an accident has occurred. The Board may establish regulations for reporting releases of extremely hazardous substances. Information collected by the Board in the conduct of its studies and investigations is subject to trade secret protection.

The Board may make recomendations to the Administrator of the Environmental Protection Agency for action to prevent or mitigate chemical hazards, either by regulation or order authority, including the listing of substances as extremely hazardous under the authorities of paragraph (2). If the Board makes recommendations, the Administrator is to respond by issuing the proposed regulation or order or stating why implementation of the recommendation would not be appropriate.

The bill provides the Administator with authority to promulgate accident prevention regulations applicable to facilities which handle any extremely hazardous substance listed pursuant to paragraph (2). These regulations may provide for release prevention by imposing design or operational standards, vapor recovery or secondary containment requirements, reporting and monitoring requirements, and release detection and correction requirements.

The bill provides the Administrator with authority to issue an order to abate any release or threat of a release of an extremely hazardous substance listed pursuant to paragraph (2) where such release endangers public health or the environment.

DISCUSSION

The objective of the new subsection (g) of section 112 is to establish programs and requirements: (1) that will prevent the accidental release of substances that may be harmful to human health and the environment as the result of even short-term exposures; and (2) that will minimize the consequences of such accidental releases when they do occur. Generally, the provisions of this subsection will apply to a list of extremely hazardus substances published pursuant to paragraph (2). However, the activities of the Administrator and the chemical safety board created by this subsection may extend to other hazards or potential hazards presented by the production, processing, handling, or storage of chemical substances that threaten human health or the environment when released to the air as the result of sudden events.

Throughout this subsection the phrases "production, processing, handling or storage" or "produce, process, store or handle" or "manufactures, stores, and processes" are used to describe activities which may give rise to a sudden, catastrophic release of hazardous substances. These phases should be interpreted to include the broadest set of activities associated with the manufacture and use of chemical substances including, but not limited to, transportation and the use of the chemical in commercial, agricultural, mining and industrial activities.

Although the programs established here are focused on releases to the air, it is not intended that these prevention and mitigation efforts be segregated from other hazardous release prevention programs conducted with respect to other media (for instance, the spill prevention, control and countermeasures developed under the Clean Water Act or the reporting requirements and removal program authorized by CERCLA). To the extent practicable, the new authorities established by subsection (g) should be implemented in conjunction with other sudden, catastrophic release prevention and mitigation efforts.

A catastrophic release is one which causes or may cause immediate (or near-term) death, serious injury or substantial property damage as the result of exposure to a hazardous substance over limited periods of time. It does not include releases, even when accidental (for instance, as the result of process upsets), where the potential impact on public health is a meausrable increase in the probability of death, illness or adverse effect which is normally associated with "chronic" exposures over a long period. Episodic releases of the latter kind are to be addressed by requirements under subsections (b) and (c). However, when considering the seriousness of the risk posed by toxicants which can cause acute effects, the Administrator may also take into account any "chronic" health effects which may be associated with these toxicants to determine whether further regulation is justified.

The objective includes both the prevention of accidental releases and the minimization of the consequences which may result. Of course, systems which are effective in preventing accidents are preferable to those which are response-oriented. Measures which entirely eliminate the presence of potential hazards (through substitution of less harmful substances or by minimizing the quantity of an extremely hazardous substance present at any one time), as opposed to those which merely provide additional containment, are the most preferred.

Paragraph (1) of subsection (g) includes a "general duty clause" placing the responsibility to design and maintain a safe facility (one free of accidents, but equipped for release mitigation and community protection should a release occur) on the owner or operator of the facility.

The "general duty clause" has been included, in part, as a response to concerns expressed by the Environmental Protection Agency. Paragraph (3) requires the owner or operator of each facility producing, processing, handling or storing an extremely hazardus substance to prepare a formal hazard assessment, identifying the potential for accidental release of these substances as the result of operations at the facility. The hazard assessment is to be made available to the Administrator. The Agency was concerned that the availability of such a document might in some way shift liability for any injury and damage caused by an accident (identified in the assessment) to the Government absent some action by the Agency in response to the assessment (e.g. requiring that the hazard be reduced or removed). In the alternative, the owner or operator might use the failure of an Agency response to an identified hazard (realized in an accidental release) as a defense against liability for injury or damages caused to another party. The "general duty clause" included in paragraph (1) will prevent either result. The liability of an owner or operator of a facility subject to the requirements of this subsection for the injury or damage caused by a sudden, catastrophic release of hazardous substances will in no way be affected by compliance with such requirements.

The Occupational Safety and Health Act includes a similar general duty clause which provides that:

> Each employer . . . shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees . . .

The Occupational Safety and Health Administration cites this clause for enforcement purposes when a hazard is found in the workplace for which there is no specific OSHA regulation or standard, and when the employer is aware that a hazard exists. The employer's awareness of the hazard may be documented by the existence of an industry code or consensus standard (such as the "Boiler and Pressure Vessel Code" or the "Compressed Gas Standard"). During its recent Chemical Special Emphasis Program (ChemSEP), OSHA frequently found that its health and safety regulations (which are designed to protect against continuous exposure to routine releases) were not well-suited to prevent or mitigate sudden, catastrophic releases and used the general duty clause frequently to justify citations for unsafe conditions requiring corrective action which were identified by the ChemSEP audits. The general duty clause established by paragraph (1) of the new subsection (g) may be used by the Agency in similar ways and for similar purposes.

Paragraph (2) of subsection (g) directs the Administrator to prepare a list of extremely hazardous substances which will be subject to various of the provisions in the revised section 112. Facilities handling the listed substances in more than threshold amounts will be required to register with the appropriate State agency pursuant to subsection (e) and prepare hazard assessments as required by paragraph (3) of this subsection. In addition, the Administrator may promulgate release prevention, detection and correction regulations applicable to such facilities under paragraph (5), issue orders or seek relief with respect to the hazards present at a particular facility under paragraph (6), and require monitoring of emissions and the installation of leak detection systems pursuant to subsection (h).

The initial version of this list is to be issued not later than 180 days after the date of enactment of this legislation. The substances on the list may be drawn from the list of 406 substances which have been included on the list required by section 302 of the Emergency Planning and Community Right-to-Know Act of 1986 (title III of the Superfund Amendments and Reauthorization Act of 1986 or SARA) or may include other chemicals which present comparable hazards or potential hazards. The list required here is to be reviewed and revised (if necessary) at least every five years.

The legislation establishes an initial statutory list of 55 extremely hazardous substances. These substances reflect the conjunction of two separate lists: (1) the list of substances subject to section 302 of SARA; and (2) the list of substances proposed under the New Jersey Toxic Catastrophe Prevention Act. To be included on the initial list established here, a substance must appear on both of these two lists. In addition to the 54 chemicals found on both such lists, trifluorochloroethylene (which is on the New Jersey list, but not on the SARA list) has been added.

The list of substances subject to section 302 of SARA was originally compiled in 1985 by the Environmental Protection Agency as part of its revised air toxics strategy and in response to the Bhopal accident in late 1984. In November 1985, the Agency inaugurated the Chemical Emergency Preparedness Program which was designed to provide guidance on emergency planning to local governments. The guidance document for CEPP covered topics including organizing the community, gathering site-specific information, contingency plan development, contingency plan appraisal and so on. Included as Appendix A in the guidance document was a list of 402 extremely hazardous substances which might appropriately serve as a first screening of substances to be covered by a community emergency planning effort.

When the Congress established a national emergency planning program by law in the 1986 Superfund amendments, it incorporated the CEPP list by reference in section 302 and required EPA to set threshold planning quantities for each of the substances on the list. The owner or operator of each facility at which one of these substances is present in amounts greater than the threshold planning quantity, must notify the State and local emergency planning commissions (authorized by the same act) of the presence of the substance. Furthermore, facilties required by OSHA to maintain or prepare "Material Safety Data Sheets" describing the hazards associated with exposure to chemical substances held at the facility must provide each MSDS (or a list of MSDS's) to the local emergency planning and public safety officials.

The Agency established this list and the threshold planning quantities as an interim final rule in the Federal Register on November 17, 1986 but at the same time proposed certain modifications to the list (including additions and deletions). A final rule was published in the Federal Register on April 22, 1987. Four substances were added and no substances were deleted from the original list.

The preamble to the interim final rule (51 FR 41570) includes a thorough discussion of the factors which the Agency took into account in listing a substance pursuant to the CEPP program. Because there is very little data available on the toxicity of these chemicals to humans, the Agency used animal data to infer potential acute toxic effects in humans. The Agency used evidence on lethality because it represents the most immediate concern in emergency situations. Acute lethality data (acquired through animal studies) for various substances is the most commonly reported toxicity information. Lethality data from animal toxicity tests are generally expressed as the median lethal concentration (LC50) when the substance has been administered by inhalation and median lethal dose (LD50) when the substance has been administered orally or dermally. These data represent dose levels or concentrations of a chemical that resulted in the death of 50 percent of the test animals exposed at the indicated concentration or dose level.

To identify those substances which are extremely hazardous, the Agency established the following criteria for concentration or exposure:

> Extremely hazardous substances are those defined with inhalation LC50 values of less than or equal to 0.5 milligrams per liter of air, dermal LD50 values of less than or equal to 50 milligrams per kilogram of body weight or oral LD50 values of less than or equal to 25 milligrams per kilogram of body weight. The specific values chosen are recognized by the scientific community as indicating a high potential for acute toxicity, and chemicals meeting the toxicity criteria are considered potential hazards. (51 FR 41573).

Where toxicity data were not available, the Agency looked at alternative health effects information. The Agency applied the criteria described above to the substances recorded in the toxicity data base called the Registry of Toxic Effects of Chemical Substances maintained by the National Institute of Occupational Safety and Health. The Agency selected those chemicals which met the criteria and which are known to be in production, but excluded radioactive materials, research materials, food additives, drugs and cosmetics. This process led to the identification of 379 chemicals. A number of additional chemicals which did not meet the criteria, but which had caused death or serious injury as the result of accidental releases were added to the list to bring the total to 402. Four more were added in the April, 1987 rule-making.

The Agency consistently notes that the list does not include all of the chemical substances which may present an extreme hazard when released. That a chemical is not on the list does not indicate that it is safe or that it cannot be the source of death, injury or property damage due to sudden, catastrophic events.

The State of New Jersey has gone through a similar set of procedures under the Toxic Catastrophe Prevention Act (TCPA) which became effective in that State on January 8, 1986. TCPA is a program with objectives similar to those addressed here, the prevention of accidental releases of extremely hazardous substances. Facilities in New Jersey handling substances classified as extremely hazardous must register with the State, provide any hazard assessment that has been done, develop risk reduction work plans and pay a fee to support implementation of the State oversight program.

TCPA initially identified 11 extremely hazardous substances by statute, but required the State Department of Environmental Protection to expand that list. The New Jersey DEP used two criteria—volatility and toxicity to identify the chemicals to be added. The toxicity review was very similar to that conducted by EPA including the use of the NIOSH data base. This review led to the identification of 93 additional substances (bringing the total to 104) which "are atmospheric dispersive hazards, gases or volatile substances at ambient conditions with combined volatility and acute toxicity equal to or greater than those of hydrogen chloride (hydrochloric acid, 36 percent aqueous), a substance on the initial statutory list."

Both the SARA section 302 list of 406 chemicals and the New Jersey TCPA list of 104 chemicals appear too extensive to serve effectively as the initial list of substances with respect to which the provisions of subsection (g) are to be developed. To focus the initial phase of these new authorities on a more manageable task, the legislation only references those chemicals which are on both lists. There are 54 such substances. The Committee also added trifluorochloroethylene which was recently the cause of several injuries resulting from an accidental release in New Jersey. TFCE is on the New Jersey TCPA list, but is not listed pursuant to Title III of SARA. These substances are listed in Part B of Committee Print 100-55 published by the Committee on Environment and Public Works of the Senate and are also listed in Figure V. 12. of this report.

FIGURE V. 12.

PART B—SUBSTANCES SUBJECT TO SECTION 112(g) OF THE CLEAN AIR ACT

Substance	CAS number	Threshold quantity in pounds
Acrolein	107-02-8	500
Acrylonitrile	107-13-1	10,000
Allylamine	107-11-9	500
Ammonia (NH_3)	7664-41-7	500
Arsine	7784-42-1	100
bis (chloromethyl) ether	542-88-1	100
Boron trichloride	10294-34-5	500
Boron trifluoride	7637-07-2	500
Bromine	7726-95-6	500
Chlorine	7782-50-5	100
Chloromethyl methyl ether	107-30-2	100
Crotonaldehyde-E	123-73-9	1,000
Diborane	19287-45-7	100
1,1-Dimethylhydrazine	57-14-7	1,000
Epoxypropane	75-56-9	10,000
Ethylene Oxide	75-21-8	1,000
Ethylenimine	151-56-4	500
Fluorine	7782-41-4	500
Formaldehyde (gas)	50-00-0	500
Furan	110-00-9	500
Hydrogen chloride	7647-01-0	500
Hyrrogen cyanide	74-90-8	100
Hydrogen fluroride	7764-39-3	100
Hydrogen selenide	7783-07-5	10
Hydrogen sulfide	7783-06-4	500
Methacrylonitrile	126-98-7	500
Methy bromide	74-83-9	1,000
Methyl chloroformate	79-22-1	500
Methyl hydrazine	60-34-4	500
Methyl isocyanate	624-83-9	500
Methyl mercaptan	74-93-1	500
Methyl vinyle ketone	78-94-4	10
Nickel carbonyl	13463-39-9	1
Nitric Acid (94% by weight or more HNO_3)	7697-37-2	1,000
Nitrogen Dioxide (10% by volume or more NO_2)	10102-44-0	100
Nitric Oxide (10% by volume or more NO_2)	10102-43-9	100
Osmium tetroxide	20816-12-0	10,000
Ozone	10028-15-6	100
Pentaborane	19624-22-7	500
Perchloromethylmercaptan	594-42-3	500
Phosgene	75-44-5	10
Phosphine	7803-51-2	500
Phosphorus trichloride	7719-12-2	1,000
Phosphoryl chloride	10025-87-3	500
Sulfur dioxide (10% by volume or more SO_2)	7746-09-5	500
Sulfur tetrafluoride	7783-60-0	100
Sulfur trioxide	7746-11-9	100
Tellurium hexafluroride	7783-80-4	100
Tetramethyl lead	75-74-1	100
Tetranitromethane	509-14-8	500
Titaium tetrachloride	7550-45-0	100
Toluene 2,4-diisocyante	584-84-9	500
Toluene 2,6-diisocyante	91-08-7	100
Trifluorochlorethylene	79-38-9	7,300
Trimethylchlorsilane	75-77-4	1,000

It should be noted that approximately one-half of the chemicals (50) selected by the State of New Jersey for its program are not on the SARA list. That is cause for concern, as it indicates that the list established under section 302 may have significant gaps. The Agency at a minimum is to give careful consideration to listing those chemicals identified by New Jersey which are not on the SARA section 302 list and should, in addition, consider the methodology which New Jersey used in selecting substances as additional criteria to be applied in the Federal program.

The legislation establishes no additional criteria or procedures for adding or deleting substances from the list. The Administrator is authorized to review and revise the list and may add substances using criteria similar to those described above. The Administrator is not authorized to remove substances from the initial list. Any person may petition (under the Administrative Procedures Act) the Administrator to add a substance. It is expected that the chemical safety board established by paragraph (4) will recommend additional substances to be listed based on its investigations of chemical accidents and potential hazards.

In addition to selecting extremely hazardous substances for the list established by this paragraph, the Administrator is also to set a threshold amount for each substance. Only those facilities producing, processing, handling or storing the substances in quantities greater than the threshold amounts will be subject to the requirements of this subsection. Generally, it is expected that these threshold amounts will be the same as the threshold planning quantities established pursuant to section 302 of SARA (when the substance on the section 302 list). Threshold quantities established under that authority have been based on a combined index of: (1) toxicity; and (2) the physical state or volatility of the substance. Chemicals which are very toxic and highly volatile were assigned a planning quantity of one pound. At the other end of the spectrum, chemicals of low concern (generally because they are solids under ambient conditions) are assigned a planning quantity of 10,000 pounds. Intermediate categories of 10, 100, 500 and 1000 pounds were also developed and chemicals were assigned to these intermediate threshold categories based on other of magnitude ranges for their ranking on the combined toxicity/volatility index.

The Agency has consistently indicated that these thresholds do not indicate "safe" quantities below which there is no risk of injury from an accidental release. They are merely screening levels used to establish priorities among facilities as the Federal accident prevention program is begun.

For each of the 55 chemicals on the initial list established by paragraph (2), except trifluorochloroethylene, the threshold amount is the same as the threshold planning quantity for that substance set pursuant to section 302 of SARA. Using this approach assures that the same facilities will be subject to both the requirements of the Emergency Planning and Community Right-to-Know Act of 1986 and the requirements established here. For TFCE (not listed under SARA) the threshold amount is 7300 pounds which was the threshold amount assigned by the State of New Jersey under the Toxic Catastrophe Prevention Act.

The legislation authorizes the Administrator to establish a different threshold amount for those substances which are used as nutrients in agriculture (principally ammonia used as fertilizer and included on the initial list) when they are held by a farmer, that is, the threshold may be different for farmers than for others holding the same substance. Further, the Administrator may completely exempt farmers from the requirements of this subsection with respect to chemicals used as nutrients. "Farmer" is to be defined in a manner similar to the definition included in the recently proposed regulations for the control of releases from underground storage tanks pursuant Subtitle I of the Solid Waste Disposal Act. Although a modification in the threshold amount or complete exemption is not made available for those who market and distribute liquid ammonia for use as a nutrient, the Agency shall work with such entities (including cooperatives) to develop a generic approach to hazard assessment for facilities in the distribution system which would aid in the identification of accident scenarios and potentially affected populations through incorporation of readily available site-specific information in a "pre-fabricated" model.

Some have suggested additional exemptions for other classes of facilities which might be implemented through the "threshold amount" provisions of this paragraph. In particular review has been given to a "small business" exemption. Such an approach was rejected in part on the findings of the Chemical Special Emphasis Program which was conducted by the Occupational Safety and Health Administration. In the aftermath of Bhopal, OSHA examined 40 facilities across a wide range of sizes and industries for the potential for catastrophic events. Among its most significant findings from the survey, OSHA reports that:

> Violations were far more prevalent in small and medium-sized establishments than in large ones . . . Some of the shorter ChemSEP inspections resulted in the greatest number of significant changes. These inspections were in small establishments, often older ones, that had relatively fewer resources (professional services) at their disposal. Here, inspections made the greatest difference.

It appears that small facilities may realize the greatest reduction in the potential for catastrophic events as the result of hazard assessments and other measures authorized by subsection (g) and, thus, an exemption or modification of requirements was not included.

Paragraph (3) of the new subsection (g) requires the owner or operator of each facility producing, processing, handling or storing an extremely hazardous substance (listed pursuant to paragraph (2)) in more than threshold amounts to conduct and make available a hazard assessment. A hazard assessment is a formal description of process malfunctions or equipment failures that could give rise to an accidental release that would have adverse health or environmental effects outside the property boundaries of the facility. The assessment identifies the equipment or processes which may fail, the magnitude of the release which may result, the impacts of the release on persons and property offsite, and the probabilities associated with each of several likely outcomes (including the worst case scenario).

It is likely that many of the facilities subject to this requirement have already conducted hazard assessments for a variety of reasons. First, under existing law, section 303(d)(3) of the Emergency Planning and Community Right-to-Know Act of 1986, the local emergency planning committees in each community is authorized to request that the owner or operator of a facility handling an extremely hazardous substance in the community prepare an assessment. Second, the chemical industry itself has been conducting a Community Awareness and Emergency Response (CAER) program. The handbook for CAER indicates that a "plant risk evaluation" and an "area risk evaluation" are important elements of a good emergency response plan. Combined, these evaluations are not unlike the hazard assessment required here. Third, hazard assessments are becoming routine in light of the risk reduction requirements now imposed by insurance carriers who underwrite pollution liability insurance for the chemical industry.

Facilities at which any of the 55 initially listed extremely hazardous substances are present must complete the hazard assessment within 18 months of the enactment of this legislation. For facilities handling substances which are subsequently listed by the Administrator, the assessment must be prepared within 12 months of listing. The assessment must fully cover each of the listed substances (if more than one is present at the facility) and must be updated every 2 years.

There are two principal objectives associated with this statutory requirement to prepare hazard assessments: (1) to identify and anticipate the consequences of the most likely and the worse case accidents so that the community in which the facility is located can adequately prepare an emergency response for a potential sudden, catastrophic release; and (2) to identify the points of weakness in the containment and protection systems of the facility so that further measures to prevent accidents (and mitigate their consequences, when they do occur) can be instituted. These prevention and protection measures may be taken by the facility owner or operator, requested or required by State and local emergency planning and public safety officials, recommended by the chemical safety board established by paragraph (4), or required through rule or order by the Administrator pursuant to paragraphs (5) and (6) of this subsection.

Hazard assessment is by now well-understood with a developing consensus on the basic elements. The bill specifies nine items which are to be included in the hazard assessments required by this paragraph. These items are taken from work done by the Advisory Committee on Major Hazards and the Health and Safety Executive, both agencies of the British government.

The first of the nine items requires basic information on the facility, its operations and the characteristics (both physical and human) of the community in which it is located. The intent here is to assure fundamental understanding of the plant, its control and safety systems, the operating conditions and practices, emergency procedures, and the leak detection, monitoring and maintenance (safety audit) programs at the site. A site visit will be necessary to gather this information.

Included in the information gathered under item (i) will be the precise longitude and latitude of each of the units at the facility which has the potential for catastrophic release. Both the Federal Emergency Management Administration and the Environmental Protection Agency (GEMS) are developing computerized mapping systems to be used in emergency planning and risk reduction and both systems require precise longitude and latitude data to enter facility-specific data into the system as a potential point of release.

The information gathered under item (i) will also include basic data on the community in which the facility is located. Information such as the location of residential areas (population density), major community facilities, geographical features which may affect plume movement, and the meteorological conditions which may prevail at the site are important elements of the data base.

Item (ii) calls for an identification of each of the components of the facility (including, but not limited to, storage vessels, process vessels, pipework, transfer couplings, other fittings, pumps, vents, scrubbers, valves, etc.) from which a release of an extremely hazardous substance is possible. Each vessel and pipe run is to be considered in turn and release rates and durations for each of the possible events is to be estimated. This systematic examination of each potential point of release produces a list of vapor (and liguid) generation rates and durations.

The third item requires an identification of any previous releases of the extremely hazardous substance from the facility and the frequency and duration of such releases. The purpose of this information requirement is to aid in the calculation of release probabilities and the consequent risks of various adverse effects occurring.

Item (iv) requires identification of the range of possible releases (including worst case events) which may occur to establish the size, concentration and duration of any potential release as it would move outside the property boundaries of the facility and into the community. The work product is a series of plume maps which illustrate the areas of the community potentially affected, the concentration of potential plumes at various locations and the likely duration of human exposure. British hazard assessment procedures consider exposure both to persons out-of-doors and to persons indoors (as the result of air exchange from the building to the ambient environment).

Item (v) is at the heart of the hazard assessment. It calls for a description of the possible consequences of each potential accident scenario. Who would be exposed? At what concentration? And for how long? This item provides a qualitative description of the adverse effects (deaths, injuries, property damage) which might result from a sudden, catastrophic release of an extremely hazardous substance. It defines the outside limits and potential scenarios for the emergency planning effort to be underatken by the public safety officials of the local community.

Item (vi) adds quantitative information to the evaluation of the consequences. It is widely acknowledged that risk procedures used in hazard assessments cannot provide precise statements of the probability of various adverse effects. But not all process malfunctions or equipment failures are equally likely and climate conditions at the time of the accident will have determinative effect on the areas of the surrounding community which experience exposure to an extremely hazardous substance. Quantitative assessments taking these variables into account allow the local emergency planning committees to compare the relative likelihood of the threat as between various release scenarios and set priorities for the develoment of response plans. However, and considering the very uncertain nature of these estimates, very low risk estimates reported pursuant to item (vi) should not, of themselves, cause a community to forego emergency planning which would have been indicated by the qualitative descriptions developed pursuant to item (v).

Item (vii) requires that the hazard assessment contain information on the toxicity of the extremely hazardous substances which may be released. This requirement may require additional health and environmental effects testing of the extremely hazardous substance.

Item (viii) requires a review of the various release prevention and protection systems that might be installed at the facility to reduce the risk of a sudden, catastrophic release. This review should be conducted in the context of industrial consensus and safety codes; equipment and practices available at other facilities known to the owner or operator; recommendations of the chemical safety board established by paragraph (4); and rules and orders issued by the Administrator (both to the specific facility and others of a similar type) pursuant to paragraphs (5) and (6). The review conducted here may consider both the efficacy and cost of the proposed prevention and protection measures.

Finally, item (ix) requires a sensitivity analysis, that is, a test of the assumptions to determine whether the qualitative or quantitative assessments would be significantly different if values for basic variables (release rate, concentration, duration, windspeed, vaporization, etc.) were other than predicted (because the original value or range of the assumptions was incorrect).

The legislation provides for wide availability of the completed hazard assessments to assure that the information contained will be used in emergency planning and prevention programs. The assessments are to be available to the Administrator, the chemical safety board established by paragraph (4), the State in which the facility is located, and to any emergency planning committee or public safety agency responsible for emergency planning or actual response with respect to a release from the facility. The assessments will also be available (for a charge not to exceed the legitimate cost of printing) to the general public subject to the confidential business information provisions of the Emergency Planning and Community Right-to-Know Act of 1986.

Many large chemical and industrial firms are already preparing hazard assessments and in some cases using methodology different than that specified here. On a case-by-case basis the Administrator may accept hazard assessments which are substantially equivalent to those required by paragraph (3), but which do not contain in the same format each of the items specified. These alternative assessments shall only be considered equivalent if they have been prepared or begun in advance of these requirements, if they reflect a substantial level of effort, if they facilitate an emergency planning response of high quality and if they adequately consider prevention and protection measures which may be employed to reduce the likelihood of a sudden, catastrophic release.

The Administrator is to publish guidance on the preparation of hazard assessments within 12 months of the enactment of this legislation. The guidance may include information on parameters (concentrations, durations, failure probabilities) for various substances, processes and failure scenarios to be used in the development of hazard assessments. The guidance may also include further specification of the considerations to be included in a determination that an existing assessment is "equivalent" with respect to the requirements of this paragraph.

The Administrator is also to establish a program of long-term research to develop and disseminate information on hazard assessment methodologies and techniques including establishment of the appropriate parameters and statistical assumptions to be used in such assessments. This research will include activities at spill test facilities to validate assumptions on the concentration, duration and dispersion of plumes of extremely hazardous substances which may be released through catastrophic events. Recent research indicates that toxic clouds may be 10 to 100 times more concentrated than previously assumed. It will also include testing of containment systems and emergency relief systems commonly in use to determine whether they perform as expected.

The requirement to perform a hazard assessment applicable to facilities handling extremely hazardous substances in more than threshold amounts may be enforced by the Administrator through subsections (a)(3), (b)(3) or (c)(1) of section 113 of the Clean Air Act.

Paragraph (4) of the new subsection (g) establishes an independent safety board, to be known as the Chemical Safety and Hazards Investigations Board, to investigate accidents resulting from the production, processing, handling or storage of chemical substances which result in fatalities or serious injury to persons among the general public or substantial property damage (including environmental harm) outside the property boundaries of a facility experiencing a chemical accident.

The new chemical safety board is modeled on the structure, activities and authorities of the National Transportation Safety Board (NTSB), an independent Federal agency which investigates accidents in the transportation industry (aviation, railroads, pipelines, highway and marine transportation). The antecedents of the NTSB go back to the Air Commerce Act of 1926 which created an independent agency to investigate, record and make public the causes of accidents in the rapidly growing commercial aviation industry. Through several reorganizations, including the Federal Aviation Act of 1958 (which firmly separated the rule-making (in the Federal Aviation Administration) and investigatory functions (in the Civil Aeronautics Board) in aviation safety programs) and the organization of the Department of Transportation in 1966, the Bureau of (Aviation) Safety has generally been a 5-member, quasi-independent entity charged with determining the cause or probable cause of fatal air crashes in commercial and general aviation and recommending measures to the rule-making authority (FAA) that might prevent similar accidents in the future. The Independent Safety Board Act of 1974 established the current NTSB which, although aviation safety is still the paramount concern, also has investigatory responsibilities in other transportation sectors. NTSB now functions with 347 FTEs and an annual budget of approximately $25 million. Many of the issues raised in the following discussion reflect the long history of the Federal effort to improve the safety of air travel by supporting an independent and expert safety board to investigate serious accidents, determine the cause or causes and recommend improvement in equipment, training or procedures which when required of those in the industry might reduce accidents and fatalities.

The chemical safety board is to have 5 members. The chairperson, who will also be the chief executive and administrative officer of the Board, will be nominated by the President and confirmed by the Senate. The other four Board members will be appointed by the Administrator of the Environmental Protection Agency. These four members may also be employees of EPA or other Federal agencies. The purpose of this interlocking personnel structure (although the authorities and actions of the board are to be strictly independent) is to facilitate coordination with other agencies of the Federal government which have accident investigation and prevention functions. At least 3 of the members are to have demonstrated technical expertise in professional fields related to accident investigation including accident reconstruction, safety engineering, human factors, chemical safety, toxicology or chemical regulation. Special emphasis should be put on expertise in "human factors" and the role that operator failures play in causing accidents. In other fields, the United States Government has fallen behind the international community in the use of operator training and development of operating and emergency procedures to prevent accidents and minimize their consequences.

The Board members will serve for a term of five years. They may be reappointed and may continue in office (after the five-year period) until a successor is appointed. The Board is given the power, subject to civil service laws, to hire staff including investigators, attorneys and administrative law judges. The chairperson of the Board is given authority for directing the work and assignments of the staff except that each Board member may be assigned such personal staff as are necessary to carry out responsibilities of a member. The chair's conduct of the executive function is subject to oversight by the Board as a whole.

The Board will operate by majority vote, but may (by vote) delegate responsibilities to the chairperson or other member, except that it shall require a majority vote of the full Board to issue a report on the cause or probable cause of an accident, make a recommendation to the Administrator or the head of another Federal agency, or promulgate a rule.

The independence of the Board in its official duties (finding the cause or probable cause of serious accidents and recommending requirements or orders which will prevent accidents in the future) is essential for several reasons. First, it is unlikely than an agency charged both with rule-making and investigating functions would be quick to acknowledge that existing requirements were insufficient to prevent an accident. In fact, the investigations conducted by agencies with dual responsibilities tend to focus on violations of existing rules as the cause of the accident almost to the exclusion of other contributing factors for which no enforcement or compliance actions can be taken. The purpose of an accident investigation (as authorized here) is to determine the cause or causes of an accident whether or not those causes were in violation of any current and enforceable requirement. When the causes are fully understood, that understanding may then be used to modify requirements to reduce the possibility of recurrence.

Second, the Board is intended as an organizational stimulus to an appropriate amount of regulatory activity by the Environmental Protection Agency in this area. Paragraph (5) of subsection (g) gives the Administrator new authority to issue requirements to prevent accidents (and mitigate their consequences) at facilities handling extremely hazardous substances. Were this authority completely discretionary (without any forcing mechanism) there is some doubt whether the Agency would use it at all. It may have been possible to stimulate use of the accident prevention authority with a series of specific statutory directives including deadlines for the promulgation of regulations, a list of devices or facilities to be covered, a menu of specific hazards to be addressed, and so on. However, that degree of specificity in statutory language might be counterproductive at this point in the development of Federal accident prevention authorities. As an alternative, the Board is created as an independent source of expertise which may make recommendations for rules and oders to the Administrator. These recommendations may include a schedule for implementing the proposed actions. The Administrator is required to make a formal, public response to each recommendation. A Board which did not operate independent from the Administrator's day-to-day direction (notwithstanding the Administrator's role in appointing four of the members) would defeat the objective of stimulating action—a stimulus created through the organizational tension built into the statutory relationship between the Board and the Agency.

The Board has seven enumerated duties: (1) to investigate serious accidents which result from the handling of chemical substances and determine the cause or probable cause of each accident; (2) to report in writing on the results of each investigation; (3) to make general recommendations to the Congress, other Federal agencies, State and local governments and entities in the commercial and industrial sector on steps that can be taken to reduce the likelihood or consequences of chemical accidents; (4) to recommend specific rules and orders to be issued by the Administrator under authority of this subsection to prevent or minimize the consequences of chemical accidents; (5) to conduct studies and investigations at the request of other governmental health and safety agencies where there is evidence of a potential hazard; (6) to develop hazard assessment techniques; and (7) to establish requirements for reporting accidents including measures to preserve evidence which may substantiate the cause or probable cause of the accident.

The principal role of the new chemical safety board is to investigate accidents to determine the conditions and circumstances which led up to the event and to identify the cause or causes so that similar events might be prevented. The accidents which the Board is to investigate are those which result from the production, processing, handling or storage of a chemical substance (not limited to the extremely hazardous substances listed under paragraph (2)) which result in a death or serious injury to a person in the general public or substantial damage to property off-site.

It is not necessary that a member or employee of the Board conduct each of these investigations. The Board is given authority to contract (through memorandums of understanding) or coordinate with other agencies (most especially the Environmental Protection Agency) which may also be conducting investigations. Although the Board is specifically directed to coordinate its investigations with those of other agencies, it is up to the Board to determine which investigations it will pursue and which it will accomplish through contract, keeping in mind that other agencies will have interests (principally, enforcement) which may not be in concert with those of the Board. In a time of limited Federal resources, it would be counterproductive to specify by statute those accident types which the Board is to investigate on every occasion and those which may be delegated to other agencies. Such specficity may stretch limited resources so thin that few individual investigations will produce the insights necessary to make significant gains in safety.

By way of example, NTSB contracts with the Federal Aviation Administration (which is usually onsite for enforcement purposes) for the investigation of many of the accidents in general aviation while keeping those accidents which involve commerical air carriers within its jurisdiction. However the (chemical safety) Board choose to allocate the principal responsibility for investigation, it must assure that a Federal agency competent to fulfill its needs will conduct an investigation of every chemical accident causing death, serious injury or substantial property damage.

The role of other parties in accident investigations conducted by the Board may be established by regulation. In the case of chemical accidents many parties will be present during the initial stages of an investigation. Generally, the owner or operator of the facility, local emergency response and public safety personnel, and representatives of State and Federal agencies with enforcement responsibilities will be onsite in the period immediately after an accident. All of these parties have legitimate functions which warrant their presence on the scene. However, questions arise when representatives of possible claimants or insurers seek access to the accident site. Under other authorities (aviation) such parties have been prevented from entering accident sites during the conduct of the governmental investigation. Such exclusion is not provided for here. To further protect the rights of those who may suffer injury or loss as the result of chemical accidents, the Board is instructed to carefully preserve the evidence it gathers as it may be relevant for use in later litigation. Further, the Board is directed to conduct its investigation (including laboratory testing of materials and equipment involved in an accidental release) so as not to jeopardize such proceedings. This is not, however, an instruction to the Board to conduct its own investigations so as to facilitate the use of its findings in other proceedings to determine fault or liability. In most cases the standard of evidence in the Board's proceedings will be less rigorous that that required in a court of law.

The Board is encouraged to participate in the investigation of accidents which occur at facilities located in other nations, both to contribute its own expertise to a determination of the cause or probable cause, and also to gain insight and experience which may be useful in preventing accidents or minimizing their consequences with respect to events or facilities of a similar type located in the United States. To the extent that participation would be inhibited by "sunshine" law, including the Freedom of Information Act, which are applicable to the Board's U.S. operations, it shall develop mechanisms that may facilitate participation in foreign investigations which are not inconsistent with FOIA, but also do not unnecessarily divulge information which would be held confidential in the nation in which the accident occurred.

The Board is given authority to conduct hearings, subpoena witnesses and compel testimony, and to administer oaths in the conduct of its investigations. These hearings will generally be recommended to the Board by investigatory staff, will be conducted by administrative law judges employed by the Board, and will be conducted according to the Administrative Procedures Act. The Board may collect written information by order directed to any person engaged in the production, processing, handling or storage of chemicals on matters which are pertinent to the duties of the Board. An officer or employee of the Board may conduct an inspection and take samples (including samples of substances present in processes or releases) at any facility where extremely hazardous substances are produced, processed, handled or stored. These authorities to conduct hearings, gather information, and conduct inspections are to be construed in the broadcast way so as to facilitate the activities of the Board and the objectives of this Act.

The role of members of the Board in actual accident investigations is not specified. They may, of course, be present at the scene of an accident, at evidentiary hearings and in other proceedings. The precise role that each member takes in these activities will be the perogative of the member and will depend on his or her expertise and the division of responsibilities within the Board.

The purpose of the investigation is to determine the conditions and circumstances which led up to the accident and to identify the cause or probable cause. It is not the role of the Board to apportion blame or to fix liability; that is the responsibility of a court of law. Rather, the Board is to identify those actions, omissions, events, and conditions (or combination thereof) which led to the accident or incident for the purpose of recommending modifications to processes, equipment, and procedures to prevent such accident or incident in the future. The Board should take an "all cause" theory in discharging its investigatory duties. It is not the single, necessary or sufficient cause which is to be the focus of the Board's inquiry, but all circumstances which contributed to the accident (and which may effectively be modified to improve safety) are circumstances of concern. "Multiple causation" is, in fact, the norm and it is expected that the Board will follow many strands of inquiry in response to each accidental release. When stating its conclusions on cause or probable cause it is not expected that the Board will accuse any party to fix fault. Rather, and to the extent practical, the Board is to give a precise and factual statement of why the event occurred. It is to be understood that the Board's report may not absolutely identify the cause (when insufficient information is available) and may include statements which indicate only the probability that a particular factor contributed to the outcome (e.g. "in all likelihood", "may have been an influencing factor", etc.). It is to be emphasized again that the purpose of the Board's investigation is not to buttress the case for a remedy to those injured or suffering loss by allocating liability, rather it is to provide remedy for the community as a whole by identifying those factors which caused the accident and which may be modified to prevent a recurrence.

The Board is required to issue a report on each investigation it conducts which will describe the event and identify the cause or probable cause. These reports are a statement of the Board (not staff) and are to be issued on a majority vote of the Board and should be issued in a timely manner, usually within 6 months of the accident unless a prolonged investigation of contributing causes is necessary. To assure quality in the report, the Board may wish to establish a procedure which allows for publication of a preliminary staff draft report, followed by a period of public comment, before the Board votes on the final report. In the compilation of materials which lead up to a report, the Board will establish a public docket for each investigation which will include field reports, factual summaries prepared by staff, communications, and the comments of interested persons or parties to the investigation.

Based on its investigations and reports, the Board is to make recommendations to the Administrator with respect to rules and requirements which may be promulgated under paragraph (5) and orders which may be issued under paragraph (6) of this subsection to assure the safe operation of facilities producing, processing, handling or storing chemical substances. These recommendations may also include proposals to list chemicals as extremely hazardous substances under paragraph (2). To the extent possible, the Board will make its recommendations in the form of a proposed listing, rule or order. The recommendation may include a schedule for the issuance of and compliance with the rule or order.

The Administrator is to respond to recommendations of the Board within 180 days of receipt. The Administrator's response is to be written and will indicate whether the recommendation will be implemented in full, in part or not at all. If the Administrator chooses not to implement some part or all of the recommendation or if it will be implemented but not according to the schedule recommended by the Board, the Administrator will explain in writing why the recommendation will not be fully implemented.

The Board may also issue more general reports to the Congress and make recommendations to other Federal or State or local agencies and to owners and operators of facilities engaged in chemical production or handling to suggest measures that might be taken to improve the safety of operations. The Board may also conduct investigations and studies at sites where any of the 406 chemicals subject to section 302 of the Emergency Planning and Community Right-to-Know Act of 1986 are present, whether or not an accident has occurred when there is evidence of a hazard or potential hazard. These investigations shall only be undertaken in response to a request from another Federal agency with responsibility to protect public health and safety (including but not limited to the Environmental Protection Agency, the Department of Transportation, the Occupational Safety and Health Administration, the Department of Health and Human Services, the National Transportation Safety Board, the Nuclear Regulatory Commission, and the Federal Emergency Management Administration).

The Board is to be actively involved in the preparation and use of hazard assessments required under paragraph (3) of this subsection. Because of its expertise the Board will be uniquely qualified to suggest procedures for the conduct of hazard assessments which will contribute to the identification of potential accident scenarios and definition of the likely effects. The Administrator is to conduct a long-term research program with respect to the techniques for hazard assessment and may choose to contract with the Board for some portion of that research.

The Board may establish regulations for the prompt reporting of accidental releases which are subject to its investigatory jurisdiction. These reporting requirements may be coordinated with other reporting requirements established by the Agency (for instance, under section 103 of CERCLA). These rules shall also provide for the preservation of evidence at the site of the accident so that the Board may properly conduct an investigation to determine the cause or probable cause when its representatives arrive at the site of the accident.

Requirements imposed under paragraph (4)(E)(vii) with respect to reporting may be enforced by the Administrator under subsections (a)(3), (b)(3), and (c)(1) of section 113 of the Clean Air Act.

The Board is given authority to promulgate administrative rules as may be necessary to carry out its functions. These will include rules for the conduct of field investigations and hearings.

Information collected by the Board in an investigation or study is subject to the same trade secret protections afforded other information gathered by the Environmental Protection Agency under the Clean Air Act. Although protection may be provided, it must be formally requested in writing by the person whose competitive position may potentially be damaged and is only subject to protection at the direction of the Board through case-by-case determinations. In no event shall a request for trade secret protection interfere with the Board's duty to investigate an accident, determine the cause or probable cause and report to the public the results of the investigation including the sequence of events which led up to the accident and the cause or causes. No information as to the release or emissions from a facility (including the chemical name of the substance released) shall be afforded trade secret protection.

Paragraph (4) includes an annual authorization of $25 million for each of the fiscal years 1988 through 1992 to carry out the duties assigned to the Board.

Paragraph (5) of the new subsection (g) provides the Administrator with authority to promulgate regulations to prevent, detect and correct releases from all devices and systems at facilities which manufacture, store or process extremely hazardous substances listed pursuant to paragraph (2) in more than threshold amounts.

The Administrator may list the substances with respect to which the regulations will apply at the time requirements are promulgated.

The authority provided here is to be broadly construed. It is comparable in scope to the authority for spill prevention, control and countermeasures under section 311 of the Clean Water Act. It is intended to allow the development and implementation of requirements that will prevent the sudden, accidental release of extremely hazardous substances and to mitigate the hazard presented should a release occur. Authority to prevent routine releases (including leaks) of air pollutants which may cause acute or chronic adverse health effects is provided in subsection (b).

The requirements issued under this paragraph may apply to any and all devices and systems used to produce, process, handle or store extremely hazardous substances. Examples of the type of requirements that might be promulgated are listed and include "monitoring, record-keeping, reporting, vapor recovery, secondary containment and other design, equipment, work practice and operational requirements."

The interim report by the Environmental Protection Agency entitled "Review of Emergency Systems" which was required by section 305(b) of the Emergency Planning and Community Right-to-Know Act of 1986 mentions four categories of technologies or techniques that give preliminary definition to the prevention authority provided here:

> (1) *Hazard evaluation,* that is, quantitative and qualitative techniques for determining what series of events could result in an accidental release;
>
> (2) *Pre-release prevention,* that is, intrinsic and extrinsic systems to reduce the probability that the primary containment of a chemical in a process line will be breached (often called "loss of containment");
>
> (3) *Pre-release protection,* that is, control techniques such as flares, scrubbers, or holding ponds to contain, destroy or reduce the quantity of the substance before it is subject to release; and
>
> (4) *Post-release mitigation,* that is, measures that can be taken after a release to the environment has occurred to limit the spread of the released chemical and minimize damage to public health and the environment.

Hazard evaluation is discussed above in the context of hazard assessments which are required for all facilities producing, processing, handling or storing extremely hazardous substances listed pursuant to paragraph (2) in more than threshold amounts.

Pre-release prevention systems are intended to assure that primary containment of a chemical process will not be breached. Pre-release systems include those designed into a process (called "intrinsic systems" by EPA) to control the flow, pressure, temperature and concentration of a process. They may specify fabrication and other design standards for equipment including pipes, vessels, valves, etc. They may also include redundancy and back-up systems. Prevention systems may also be required outside of the process (called "extrinsic systems" by EPA) and as a retrofit to existing systems and may include modifications to equipment or process parameters (including substitution of less hazardous substances). Of course, management and operating procedures play an important role in preventing accidential releases through operator training, the development of emergency procedures and maintenance and safety reviews.

Pre-release protection systems are intended to contain, destroy or reduce the quantity of extremely hazardous substances before they move off-site. Pre-release protection technologies include flares, scrubbers, absorbers, double liners and other types of secondary containment. They are designed to destroy the hazardous substance through combustion or chemical neutralization or contain the substance until remedial action can be taken. Back-up systems of this type offer important safeguards for some accidental releases, but as the events in Bhopal demonstrated, can be overwhelmed by large releases. In response to the Bhopal tragedy, effective prevention for methyl isocyanate releases has been provided at one site by modifications in the production process which have greatly reduced the quantity of the chemical held at any point during the series of reactions leading to the final product. Similarly, prevention technologies are to be generally preferred to protection technologies where prevention eliminates the possibility of a serious event.

Post-release mitigation measures are used after loss of containment has occurred to reduce the hazard before the substance moves off-site. They include covering free liquids and the use of foam and other agents to prevent fire, explosion, or volatilization of free liquids.

The authorities provided in paragraph (5) also include requirements for release detection systems. The EPA report "Review of Emergency Systems" includes discussion of these technologies including on-site detection equipment designed to warn of a release event in its earliest phases and various monitoring systems that can be used to track a release once it has moved off-site and into the community. Active use of the authorities provided in this section will assure the development of highly sensitive systems able to cover broad areas of possible release.

It is to be noted that the Chemical Safety and Hazards Investigations Board may recommend to the Administrator various requirements to be promulgated under authority of this section. The legislation might have directed the Administrator to issue release prevention, detection, and correction regulations for various industries or pollutants by a date certain, as has been done in other statutes (for instance, underground storage tank rules under Subtitle I of the Solid Waste Disposal Act). In this instance, however, a different methodology has been chosen to assure that adequate and timely use is made of these authorities. The Board is designed as an independent agency with special expertise in the investigation and prevention of chemical accidents. Its recommendations require a formal response from the Administrator and, although the Administrator may decline to issue a recommended requirement for good cause, it is expected that in most instances the Board's recommendations will be implemented in a timely way. In an area of great complexity such as is addressed here, it is hoped that this organizational mechanism will overcome the regulatory inertia so apparent in the air program of the Agency without the inflexibility of detailed statutory provisions usually associated with legislative deadlines and hammers.

The Administrator is to coordinate actions under this authority with actions taken by the Occupational Safety and Health Administration so that requirements imposed by both agencies to accomplish the same purpose are not unduly burdensome or duplicative. This requirement for coordination in no way diminishes the Administrator's authority to act and does not imply that requirements under this section must be set aside or delayed where OSHA is acting with respect to the same hazard. Quite often protection technologies which are appropriate for workers on-site (protective clothing, respirators, etc.) and which may be required by OSHA would not be effective to prevent death or injury among the general public residing or working near a facility. It is not a purpose of this paragraph to impose additional penalties on the owners or operators of facilities where a single event violates requirements imposed both under this section and by OSHA. In response to those events a single enforcement strategy should be developed through consultation between the two agencies.

Accident prevention requirements promulgated pursuant to paragraph (5) may be enforced by the Administrator under subsections (a)(3), (b)(3) and (c)(1) of section 113 of the Clean Air Act.

Paragraph (6) of subsection (g) authorizes the Administrator to secure action through district courts which will abate any threat of imminent and substantial endangerment of public health, welfare or the environment due to the release or potential release of an extremely hazardous substance. The Administrator may also issue orders (including requirements for modifications in equipment, processes, training and procedures) and take other actions which may be necessary to protect human health, welfare or the environment. Persons failing to comply with an order may be subject to a fine of up to $25,000 per day for each day of non-compliance.

These authorities are not unlike the abatement and emergency powers granted to the Administrator under other statutes including section 303 of the Clean Air Act and section 106 of CERCLA. The Administrator is directed to publish guidance for the use of paragraph (6) in concert with these other authorities.

It is not intended that the Administrator use the order authority available under this paragraph to conduct a plant-by-plant safety review of the chemical industry as is provided for in the New Jersey Toxic Catastrophic Prevention Act. Although such an approach may be effective when implemented by an agency with significant expertise, the development of facility-specific risk reduction work plans may currently be beyond the capability of the Environmental Protection Agency. EPA may conduct audits and investigations as part of an enforcement scheme for requirements promulgated under paragraph (5), but it is not intended that a top-to-bottom investigation of every site handling an extremely hazardous substance will be conducted on a routine schedule. Such audits are the responsibility of the owners and operators of these facilities.

However, when a facility experiences an accidental release which causes death, serious injury or substantial property damage off-site, it, prima facie, presents a threat of imminent and substantial endangerment to public health. In other industries (as with pipeline operations under the Hazardous Liquid Pipeline Safety Act) facilities experiencing such accidents are only allowed to go back into operation pursuant to an order (like that which may be issued under paragraph (6)) which assures that conditions contributing to the accidental release have been corrected. The authorities of paragraph (6) can be implemented to include a prohibition on restarting a facility where an accident has occurred until corrective action pursuant to an order to remove the imminent endangerment has been taken.

Monitoring Requirements

SUMMARY

The bill adds a new subsection (h) to section 112 of the Clean Air Act providing the Administrator with authority to require the owner or operator of any facility which emits an air pollutant listed pursuant subsection (b) or (c) or which stores or holds any extremely hazardous substances listed pursuant to subsection (g) to: (1) monitor emissions and ambient air within the vicinity of the facility for the presence of the pollutant or substance; (2) install leak detection systems; and (3) report on monitoring and leak detection.

DISCUSSION

This new subsection is intended to supplement the Administrator's authority under section 114 of the Act to obtain information necessary to develop or assure compliance with emissions standards for air pollutants and requirements to prevent the accidental release of extremely hazardous substances pursuant to this section. The Administrator may require emissions or ambient air monitoring when data is needed to determine whether a substance or source category should be listed or regulated under subsections (b), (c), or (g), as well as when data is needed during the development of a standard. Data and reports developed pursuant to this subsection shall be publicly available to the same extent as data collected under section 114.

In addition, the Administrator is to use this authority and the authority of section 114 to establish emissions monitoring, recordkeeping, and reporting requirements sufficient to assure the enforcement of such standards. It is essential for the Administrator to establish these requirements in order to assure that compliance with emission standards is sustained continuously. This is particularly important where the performance of a control measure depends on proper operation or maintenance, or where a source might continue operating despite the breakdown or malfunction of control equipment.

The authorities created here are also available to the State and local pollution control agencies conducting approved programs pursuant to subsection (e).

The authority to require monitoring may, of course, be used with respect to air pollutants or extremely hazardous substances not listed and regardless of any threshold quantity which may be established at the time of listing, since it may be used for the purpose of developing regulations or conducting studies.

Leak detection is more than a monitoring system for compliance with standards and requirements. It may function as an integral part of accident prevention and protection strategies. However, leak detection is a protection measure which only comes into play only after a release has commenced. Where releases to the environment may be small and continue over a long period of time before significant environmental damage is done (gasoline leaks from corroding underground storage tanks, for instance) leak detection would play a larger role in the overall prevention and protection scheme. Where events may be sudden and catastrophic, as will generally be the case with extremely hazardous substances listed pursuant to subsection (g), leak detection systems should not be relied upon as the principal means of protecting public health and the environment.

Monitoring requirements imposed pursuant to this subsection may be enforced by the Administrator under subsections (a)(3), (b)(3) and (c)(1) of section 113 of the Clean Air Act.

RETENTION OF STATE AUTHORITY

SUMMARY

The bill adds a new subsection (i) to section 112 of the Clean Air Act to explicitly preserve the authority of States and their political subdivisions to regulate the emissions of toxic air pollutants or facilities which handle extremely hazardous substances either by: (1) imposing more stringent requirements on pollutants or facilities controlled under the authority of section 112; or (2) establishing standards or requirements for pollutants or facilities not addressed by the Agency under the Federal program.

DISCUSSION

Section 112 as amended by this legislation is intended to create a comprehensive Federal scheme for the regulation of toxic air pollutants and the prevention of accidental releases of extremely hazardous substances or mitigation of the injury and damage which may result from such releases. This regulatory regime provides a significant role for State and local governments which choose to participate in the Federal program. On other occasions where similar schemes have been enacted, Federal courts have concluded that the Federal law is preemptive of some State or local authorities even when such preemption was not explicitly stated or intended. To assure that such preemption of State and local law, whether statutory or common, does not occur, environmental legislation enacted by the Congress has consistently evidenced great care to preserve State and local authority and the consequent remedies available to the citizens injured by the release of harmful substances to the environment.

Although the Clean Air Act already contains a section (116) explicitly preserving the authorities of State and local governments, the language of current law is not entirely unambiguous with respect to the amendments made by Title V, since section 116 refers to emissions standards or the abatement or control of air pollution. To assure that a court would not find some portion of the new section 112 (for instance, the accident prevention authorities) outside the boundaries of these specifically enumerated powers, section 509 of the bill adds a new subsection (i) which preserves in the broadest way the authority of State and local governments to regulate in the same arena as section 112, with two exceptions. States and their political subdivisions may not promulgate standards or requirements applicable to a pollutant or facility which are less stringent than the Federal standards or requirements applicable to the same source or pollutant. Nothing in this subsection would allow a State or political subdivision to regulate emissions from mobile sources where that would otherwise be prohibited by the Clean Air Act.

Savings Clause

SUMMARY

Section 510 of the bill is a free-standing provision (not an amendment to the Clean Air Act) which provides that emission standards for source categories of hazardous air pollutants which have been promulgated before enactment of this legislation shall not be affected by the amendments to section 112 of the Clean Air Act made here. In addition, the Administrator is authorized to use the provisions of the existing section 112 in lieu of the provisions of the section as amended by this legislation to establish emissions standards for sources of radionuclides not yet regulated.

DISCUSSION

To further the goal of regulatory stability, the bill includes a "savings clause" providing that emissions standards which have been promulgated for source categories of hazardous air pollutants will not be affected by the amendments made in this legislation. Such standards have been promulgated for various (but not all) source categories of seven pollutant: inorganic arsenic; asbestos; beryllium; benzene; vinyl chloride; radionuclides; and mercury. One other substance, coke oven emissions, has been listed and standards may be promulgated before enactment of this legislation.

Standards which have been promulgated may in the future be amended (either on the initiative of the Agency or by court order) and any such amendment will be in accordance with the provisions of section 112 as amended by this legislation (except for radionuclides where the Administrator may choose to promulgate a revised standard under the existing or amended version of section 112). Except as provided below for radionuclides, should the court strike down a standard (or other decision) because it was based impermissably on cost or for other reasons, the new standards for that source category would be promulgated according to the provisions of the section as amended here. In respect to the consideration of cost, there is no difference between the amended section 112 and current law. Cost is appropriately excluded in setting a health-based emissions standard in both cases. Because each of these seven pollutants (excluding radionuclides) is listed pursuant to subsection (c), the emissions standard issued to replace a standard nullified would be a health-based standard. Because all of the carcinogens on the list are known human carcinogens (as opposed to probable or possible carcinogens), the repromulgated standards must "provide an ample margin of safety to protect public health." With respect to radionuclides, in the event that the standards that have been promulgated for sources of radionuclides are invalidated by a Court, this section provides the Administrator with the option, at the discretion of the Administrator, to proceed under either the existing authority or under the new authority contained in section 112, as amended by this bill.

In many cases, the Agency has declined to set standards for source categories of the eight listed hazardous air pollutants. Generally, except for radionuclides, these source categories will be subject to the amended provisions of section 112 which provides in subsection (c) that health-based emission standards will be promulgated for all source categories. The one exception to this general rule is for unregulated sources of radionuclides. The Administrator is given the discretion to continue to regulate sources of radionuclides under the current law version of section 112. If the decision not to regulate these categories is sustained by the courts (where it is currently under challenge), the Administrator will not be required to issue emissions standards. If the decision is reversed, this section provides the Administrator with the option, at the discretion of the Administrator, to proceed under either the existing authority or under the new authority contained in section 112, as amended by this bill. In the case of standards for any other category of sources, the appropriate emissions limitation will be governed by the amended section 112.

Hydrogen Sulfide Assessment

SUMMARY

This provision directs the Administrator to assess the public health and environmental hazards of hydrogen sulfide emissions associated with oil and natural gas extraction. The assessment is to include a review of existing State and industry control standards, techniques and enforcement. The Administrator is directed to use existing Clean Air authority to devise and implement a control strategy for hydrogen sulfide emissions, as appropriate to protect public health and the environment, based on the findings of the assessment.

DISCUSSION

Hydrogen sulfide is a colorless gas that is acutely fatal to humans at concentration levels of 500 parts per million and above. Severe health effects are produced by hydrogen sulfide concentrations greater than 50 parts per million. While ambient levels of hydrogen sulfide are below those known to cause symptoms of injury to higher plants, higher peak exposures associated with accidental releases may have an effect on vegetation. Effects on wildlife have not been documented from ambient hydrogen sulfide levels, although high levels from accidental releases can be lethal.

Hydrogen sulfide occurs in widely varying concentrations as a natural constituent of ill and natural gas and in some instances the concentrations may be high enough to pose a threat to human health if a release to the ambient occurs.

Recent information from EPA concerning hydrogen sulfide indicated that concentrations high enough to produce severe health effects generally are not encountered in the ambient air or in workplaces. Rather, the public encounters health-threatening levels of the gas during catastrophic releases or failures of containment processes.

In testimony a number of witnesses urged the listing of hydrogen sulfide as a toxic air pollutant under provisions of section 112. The testimony documented episodes where sudden and accidental releases of hydrogen sulfide from oil and gas facilities have caused human fatalities and injuries, numerous livestock kills and evacuation of the residents from affected areas. Many States have responded to these accidents by establishing and enforcing comprehensive regulations for the control of hydrogen sulfide releases at oil and gas extraction facilities.

Generally, these regulatory programs require that operators of facilities producing oil and natural gas with hydrogen sulfide concentrations must post warning signs, fence areas with the potential for public exposure, install safety and warning devices and establish contingency plans to alert and protect the public.

Although many State programs are implemented conscientiously, in some instances concerns have been raised that some oil-and gas-producing States may not be enforcing their regulatory programs sufficiently or may have deficient regulatory programs.

In performing the assessment and devising a control strategy, EPA should focus on the identification of deficiencies or lack of enforcement in state programs. States with hydrogen sulfide emission programs that provide adequate health and environmental protection will probably not be required to alter those programs. The purpose of this section is to assess the effectiveness and the level of enforcement of the various hydrogen sulfide control programs. It is not the intention of this provision to duplicate effective control programs with additional Federal regulation. In the development of a control strategy, including technology guidelines, the Administrator should take into account the measures already in place under those programs aggressively administered in some States. The assessment should assure the development of a more uniform application of control technology, standards and enforcement. The Administrator should examine in particular means of controlling hydrogen sulfide emissions at remote facilities.

AROMATIC HYDROCARBON STUDY

SUMMARY

This section requires the Environmental Protection Agency to prepare a report with recommendations on health impacts of mobile source benzene emissions, considering both fuel and vehicle-based control strategies.

DISCUSSION

Mobile sources in 1982 accounted for about 85 percent of the benzene emission inventory. Of the mobile source portion, exhaust emissions contribute about 82 percent, evaporative emissions about 17 percent, and refueling emissions the remaining 1 percent. Benzene is a known human carcinogen at low exposure levels and has been characterized as a hazardous air pollutant by the Environmental Protection Agency.

Benzene exhaust emissions are formed during and after combustion by cracking larger hydrocarbon molecules and by reforming from smaller molecules. Since 1973, the Agency has recognized that as the use of lead was restricted, the aromatic hydrocarbon content of gasoline would increase. In 1971, the average aromatic content of the total U.S. gasoline pool was 22 percent. By 1987, this average aromatic content had increased to 37 percent. The Agency has recognized this increase and has proposed increasing the test fuel aromatic content to 45 percent.

In analyzing the effect of gasoline volatility controls on cancer incidences caused by benzene, the Agency found that controlling volatility will have little or no impact on the number of incidences. The most likely explanation appears to be that decreases in total in hydrocarbon emissions are offset by the increases in the benzene mass fraction as more volatile fractions are reduced.

Costs and Benefits

A significant number of the provisions contained in the Committee bill are already explicitly or implicitly mandated by the existing Clean Air Act. Consequently, it is difficult to segregate the costs and benefits of the bill's new requirements from ongoing activities or expected near-term actions to be taken by the Agency. Because many provisions will be implemented over the course of decades, the accuracy of any cost estimate will be speculative at best.

Assessed in isolation, the estimated costs of the bill appear to be significant. Few would argue, in economic terms, that the estimated costs of the bill are minimal. But these costs must be weighed against the cost to society of doing nothing beyond current efforts to improve air quality. While great strides have been made toward the goal of cleaner air, seventeen years after passage of the Clean Air Act nearly one half of all Americans live in areas that do not meet even the minimal health-based standards of the Act.

Air pollution is a leading cause of lung damage. In this country we spend $16 billion each year on health care costs associated with air pollution and another $40 billion on loss of worker productivity associated with air pollution. The effects of air pollution on visibility, materials damage, damage to forests and aquatic resources and diminished agricultural crop productivity have been estimated by various studies to range from $60 billion to $100 billion annually. The costs associated with of the Clean Air Act on the overall U.S. economy are minimal while the economic effects of the Act are clearly beneficial. An analysis of the economic effects of the Clean Air Act concluded:

> The evidence will not support charges that the Clean Air Act is imposing severe costs on the U.S. economy. Net benefits have resulted, and macroeconomic measures have remained essentially unchanged. The Clean Air Act is, on balance, sound environmental policy and is consistent with sound economic policy.

While the bill will impose additional costs, there will also be additional health, environmental and economic benefits as a consequence of its implementation. Cost assessments were made concerning the version of the bill as reported by the Environmental Protection Subcommittee by EPA, the Congressional Research Service, the Congressional Budget Office, and the Office of Technology Assessment. The analytical assumptions and cost estimates varied greatly. Subsequent clarification of some of the assumption factors and corrections resulted in reduction of the original cost estimates. Actions taken by the full Committee, particularly dealing with Titles II (Acid Disposition Control) and Title V (Air Toxics), should significantly reduce the over-all cost of the legislation. The Committee has requested additional analysis by the various agencies reflecting the amendments adopted during full Committee mark-up.

Even without the additional measures stipulated in titles I and III of this bill, additional public and private resources must be expended if areas are to reach attainment under the existing Act. Consequently, it is difficult to differentiate between the base level of expenditure mandated under current law and the additional resources required by this bill. The analysis of the bill prepared by OTA observed that the ozone policy for the post-1987 period being proposed by EPA will be quite expensive, but is not likely to result in attainment in many areas. (That analysis also showed that the specific requirements of the reported bill are not "overregulation," in that in all but "3-year" areas, additional controls will be necessary to assure attainment.)

Many of the provisions contained in title I and title III (enhanced inspection and maintenance, Stage II vapor recovery, diesel fuel desulfurization, and tighter mobile emission standards) are already in effect in some areas of the country. The magnitude and pervasive nature of the air pollution problems faced in areas such as Southern California, have dictated the implementation of these control measures. Consequently, because many of the measures required in the bill have already been implemented in California with roughly one tenth of the nation's population, the national costs associated with this bill should be reduced.

Title I details the ozone and carbon monoxide control strategies for areas which will not meet the Clean Air Act attainment standards by December 31, 1987. The title extends the current deadline for attainment of the Act's standards and requires those areas not in attainment to submit revised implementation plans designed to achieve the standards by December 31, 1992.

Title II authorizes a national program requiring total annual sulfur dioxide emissions to be reduced 12 million tons from actual 1980 levels by 2000 and nitrogen emissions to be reduced by 1996. An amendment adopted by the Committee stretches out final compliance of the twelve million ton sulfur dioxide emissions reductions to the year 2000 from the original date of 1996. The bill now requires a phased reduction of 5 million tons by 1993, an additional 5 million tons by 1998, with the final 2 million ton reduction to be achieved in 2000. ICF has concluded that the net effect of this phased reduction approach would be slightly less utility sulfur dioxide reductions in cumulative terms between 1993 and 2010, compared with the original bill, with about ten percent lower present value of utility costs over that period.

Assessing the total costs of title II is a task which is difficult at best, and beset with pitfalls. This is because the costs of the program will depend upon (1) the pace at which certain technologies are developed, and (2) whether the behavior of industry decisionmakers will be economically rational. However, in an attempt to encourage the rational and timely utilization of the various pollution control alternatives, the Committee has adopted several amendments to increase the bill's flexibility while maintaining the ultimate goals.

The most optimistic assessment of the costs of Title II is probably that of the Department of Energy, assuming that utilities choose to rely on a variety of the newer, efficient technologies. If the utility industry chooses this course of action, the costs attributable to this Title could be zero.

In a November, 1987, report *The Role of Repowering in America's Power Generation Future,* the U.S. Department of Energy stated that technologies now in commercial operation could, if adopted by utilities, eliminate any incremental costs associated with an acid rain control program. On page 20, the Energy Department summarized its analysis as follows:

> In the previous section on *Changes in Cost of Electricity,* it was shown that both in the BAU * (when system factors are considered) and in an acid rain control program, repowering is capable of lowering the cost of electricity compared to conventional electric generating units. As shown below, this implies that repowering can result in emission reduction at no additional cost.

It seems highly unlikely that this would be the true consequence of an acid rain control program which adequately reduced the emissions of sulfur dioxide and oxides of nitrogen. It is more likely that some incremental costs of control would be imposed on utilities, commercial operators and their customers. The many analyses of acid rain control costs, most conducted by consultants for the Environmental Protection Agency, have placed the costs of control at several billion dollars per year. Again, however, these estimates all assume continued industry reliance on either fuel switching or scrubbing (a technology developed in the 1970's) as the means of compliance. It seems highly unlikely that none of the promising technologies would become commercially available. It also seems highly unlikely that utilities and others would choose to reject increases in conservation and other efficiency improvements. Nevertheless, EPA estimates assuming both of these worst case outcomes provide an upper bound of costs.

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* BAU = Business as Usual

It must be emphasized, however, that all of these estimates are measured against "base cases" which themselves are subject to change because they make certain assumptions with respect to growth, the relative shares of the nuclear, coal, natural gas, and oil industries, and so on. The effect of changes in these base case assumptions was illustrated most vividly earlier this year when EPA revised its assumptions, thus projecting a decrease in coal miner employment of several thousand jobs compared to earlier projections. Again, this projected decrease from previous base cases was a result of changes in assumptions, not the impact of an acid rain control program.

For example, in the 1981–82 period, EPA officials opposed the enactment of an acid rain control program on the grounds that as powerplants retired on reaching age 30 emissions would decline very sharply and rapidly. Relying on such assumptions, the provisions of title II relating to compliance with a 0.9 pounds per million Btu standard at age 30 and with the New Source Performance Standard at age 40 would have a comparative cost of zero or, perhaps, a net decrease. However, in the intervening years, the Agency has changed its base case assumptions and now expects powerplants to retire upon reaching age 45 or 60, depending on the analysis.

A substantial number of analyses have also been conducted for the Department of Energy, utilizing the same computer model and consulting firm as the Environmental Protection Agency. While none of the analyses approximate the Committee bill, portions of the DOE projections seem to be the closest. These are presented below.

The DOE reference case assumes that the current New Source Performance Standard (NSPS), which effectively mandates wet flue gas desulfurization (wet scrubbing) will apply to all plants going on line on or before the year 2000. It assumes that after that date a somewhat more stringent standard will apply, resulting in an emissions rate of 0.4 pounds of SO_2 per million Btu from 2001 to 2010 and 0.2 pounds per million Btu thereafter. (These emission rates seem somewhat unrealistic in view of DOE's own subsequent evaluations of emerging technologies, which can achieve emission rates of 0.07 pounds of SO_2 per million Btu and less.) The reference case also assumes a powerplant lifetime of 60 years, following a refurbishment at age 30. Although the analysis does not address this question, it appears to assume that the refurbishment occurs at age 30 with substantial modification of the individual units, but with no additional pollution controls.

The 10-million ton rollback in the DOE analysis assumes a 10-million ton reduction in SO_2 emissions from 1980 levels by 1995. It therefore resembles somewhat the first two phases of the title II reduction program. It does not, however, assume some of the other aspects of title II (e.g. multi-stage utility bubbling).

The 45-year lifetime identified in the DOE analysis assumes a powerplant lifetime of 45 years, rather than the 40-year requirement imposed by the Committee bill after 2003. The analysis apparently did not include a cost component for this alternative, but it is presented here because it sheds light on the impact of a lifetime limitation on total emissions.

The document in which these estimates are contained is *An Economic Assessment of Long-Term Emission Reduction Alternatives*, dated May 1985.

UTILITY SULFUR DIOXIDE EMISSIONS

[Millions of tons]

	1985	1990	1995	2000	2010	2020	2030
Constant NSPS—45 year life	18.1	18.7	19.3	19.0	16.3	11.3	10.7
Reference with NSPS upgrades	18.1	18.7	19.5	20.0	19.7	16.7	12.3
Ten million ton rollback:							
Absolute	18.1	18.7	9.6	10.8	11.9	11.9	10.7
Change from reference			−9.9	−9.2	−7.8	−4.7	−1.6

CHANGE IN UTILITY CUMULATIVE CAPITAL COSTS

[Billions of mid-1984 dollars]

	1985	1990	1995	2000	2010	2020	2030
Ten million ton rollback			+6.1	+6.8	+8.3	+7.7	+6.1

CHANGE IN UTILITY ANNUALIZED COSTS

[Billions of mid-1984 dollars]

	1985	1990	1995	2000	2010	2010	2030
Ten million ton rollback			+3.2	+3.1	+2.5	+1.3	+0.2

An analysis which may be more instructive in terms of the impact of title II on utility costs as well as electricity rates is that prepared in June 1987 by the Environmental Protection Agency. That analysis examined the emissions and cost impacts of a Statewide limit of 0.9 pounds of SO_2 per million Btu of heat input.

UTILITY SULFUR DIOXIDE CONTROL COST FORECASTS—30 YEAR CASES VS. EPA BASE

	Change from EPA base 30-yr 0.9 restr. trading 2000
Utility annual costs (billions of mid-1987 $/yr.):	
Capital	0.9
O&M	0.4
Fuel	0.5
Total	1.8
Utility cumulative capital costs (billions of mid-1987 $/yr.):	
31—Eastern States	5.3
17—Western States	0.4
Total United States	5.8
Average cost per ton SO_2 removed (mid-1987 $/ton)	243.8

UTILITY SULFUR DIOXIDE CONTROL COST FORECASTS—30 YEAR CASES VS. EPA BASE—Continued

	Change from EPA base 30-yr 0.9 restr. trading 2000
SO_2 retrofit scrubber capacity (GW):	
31—Eastern States	8.7
17—Western States	0.7
Total, United States	9.4

CHANGE IN ANNUALIZED UTILITY SULFUR DIOXIDE CONTROL COSTS BY REGION—30 YEAR CASES

[Millions of mid-1987 dollars]

	EPA base case 2000	Change from EPA base 30 yr. 0.9 restr. trading 2000
Maine/Vermont/New Hampshire	796	31
Massachusetts/Connecticut/Rhode Island	2,954	64
New York	4,930	158
Pennsylvania	4,294	208
New Jersey	2,134	51
Maryland/Delaware	1,878	92
Virginia	2,628	74
West Virginia	1,682	45
North and South Carolina	5,231	127
Georgia	3,308	−6
Florida	6,267	85
Ohio	4,413	173
Michigan	3,197	81
Illinois	4,535	35
Indiana	3,341	189
Wisconsin	1,453	36
Kentucky	2,741	24
Tennessee	2,345	44
Alabama	2,362	51
Mississippi	729	−0
Minnesota	1,346	12
Iowa	932	18
Missouri	2,189	61
Arkansas	1,003	18
Lousisiana	3,143	33
Total 31—Eastern States	69,831	1,701

PERCENT CHANGE IN ELECTRICITY RATES BASED ON ANNUALIZED COSTS—LEVELIZED BASIS—30 YEAR CASES

[In percent]

	Change from EPA base 30 yr. 0.9 restr. trading 2000
Maine/Vermont/New Hampshire	1.7
Massachusetts/Connecticut/Rhode Island	1.1
New York	1.2
Pennsylvania	1.9
New Jersey	1.0
Maryland/Delaware	2.5
Virginia	1.9
West Virginia	1.1
North and South Carolina	1.4

PERCENT CHANGE IN ELECTRICITY RATES BASED ON ANNUALIZED COSTS—LEVELIZED BASIS—30 YEAR CASES—Continued

[In percent]

	Change from EPA base 30 yr. 0.9 restr. trading 2000
Georgia	−0.1
Florida	0.8
Ohio	2.0
Michigan	1.2
Illinois	0.3
Indiana	3.1
Wisconsin	1.1
Kentucky	0.6
Tennessee	1.0
Alabama	0.9
Mississippi	0.0
Minnesota	1.0
Iowa	1.0
Missouri	1.0
Arkansas	1.5
Louisiana	0.9
Total 31—Eastern States	1.2

Note: EPA estimates for 17 Western States are omitted due to the dissimilarity of the 0.9 option to the provisons of title II with respect to these States.

A second amendment concerning nitrogen dioxide emission reductions should reduce the cost for these emissions by roughly forty percent. As a result of the amendment, nitrogen dioxide emission reductions will focused on more cost effective sources rather than cyclone boilers. Emissions reductions from this type of boiler would have been costly and difficult to attain.

An amendment requiring power plants 40 years and older to meet NSPS will increase costs of implementation in the long term. It is difficult to precisely estimate the cost of this provision but after 2003 costs would increase significantly.

Title III of the bill deals with emissions of hydrocarbons, nitrogen oxides, and carbon monoxide from motor vehicles and hydrocarbons from a group of area sources using solvents in their activities. The title authorizes a reduction in the sulfur content of diesel fuel and mandates the use of oxygenated fuels in carbon monoxide nonattainment areas.

Motor vehicles contribute a significant portion of air pollution emissions. About 70 percent of carbon dioxide, 34 percent of volatile organic compounds, over 40 percent of nitrogen oxides, and roughly one fifth of total particulate emissions come directly from motor vehicles. There have been significant reductions in pollution from autos despite a 25 percent increase in vehicle miles traveled. But motor vehicle pollution levels are expected increase in the 1990's if preventative measures are not taken now.

In 1986 the average price of a new domestic automobile was $12,473. The average price of an imported vehicle was $13,014. A study by EPA in 1981 estimated that emission control equipment already required added from $250.00 to 425.00 to the cost of an automobile. In 1985 dollars the cost would be roughly $500.00 to

$600.00. This compares to the cost of an automatic transmission at $490.00 or air conditioning at $675.00. Taken over the average useful life of the vehicle (10 years), $50 to $60 per year seems a small price to pay for cleaner air.

Title III also directs EPA to establish standards and regulate emissions and ash disposal activities from municipal waste incinerators. There are approximately 110 municipal waste incinerators in operation across the country. Within the next 5 years, an additional 200 units have been planned or scheduled to come into operation. This provision may cost $350 million annually to implement.

Title IV requires EPA to promulgate six new National Ambient Air Quality Standards. Each of the standards designated in the bill have been under consideration or will be shortly by the Agency under the five year review requirement of the existing Act. The Agency would also be required to expedite its current activities and make annual progress assessments to Congress. Consequently, additional agency costs for review and promulgation of these new standards should be minimized.

Title V authorizes a comprehensive program to control hazardous air pollutants. The title would establish a comprehensive Federal and State program to regulate toxic air pollutants.

Costs to the regulated community which may result from the implementation of title V can be grouped in four areas: (1) technology-based standards; (2) health-based standards; (3) area source controls; and (4) hazard assessments.

The bill requires EPA to promulgate emissions standards for the major sources (more than 5 tons per year) of 224 hazardous air pollutants over a 10 year period. Reviewing this provision, the Environmental Protection Agency estimated costs at between $370 million and $1.38 billion annually. This estimate was based on control costs for volatile organic compounds as experienced in areas not in attainment with the NAAQS for ozone. EPA estimated that 15,000 facilities might be subject to control at an average cost of $25,000 to $92,000 per facility per year. It should be noted that this new authority allows for consideration of the costs imposed on regulated facilities in setting emissions standards—a consideration not allowed by current law.

The bill preserves in modified form the authority to set health-based standards where the adverse health and environmental effects of emissions are particularly severe. As with current law, the list of substances regulated is to be determined by the Agency (there is no statutory list) and the objective of the standards is to "provide an ample margin of safety to protect public health." EPA's cost estimate for this provision is $3.3 billion annually. That estimate was based on cost projections for just two sources of pollutants already listed—boilers (which emit radionuclides and arsenic) and coke ovens (the whole emissions stream for which has been listed). Further regulation of these sources would have been required by the working paper which was reported by the Subcommittee on Environmental Protection as it required the promulgation of standards for all sources of a pollutant listed under subsection (c) of the modified section 112. To moderate the cost impacts of this provision, the bill was modified by the full Committee (after the EPA cost estimate was made) to provide that boilers and coke ovens may be controlled under the provisions of subsection (b) which authorizes technology-based standards (taking costs into consideration). To reflect this modification the estimate for the technology-based standards has been increased from $1.4 billion as originally projected by EPA (and that was the high estimate) to $1.7 billion and the cost impacts of boiler and coke oven standards have been removed from the estimate for health-based standards. The cost estimate for health-based standards reported here—$300 million annually—is based on the expectation that some pollutants will continue to be listed under subsection (c) and that the costs for the regulated sources will be similar to those that were experienced by sources already regulated under section 112. From that perspective, the $300 million estimate is relatively high by comparison to the cost of previously issued standards.

The bill establishes as a national objective a 55 percent reduction in the emissions of the 224 listed toxic air pollutants from area sources over a ten-year period. Area sources are the small, diverse sources of toxics emissions which include dry cleaners, service stations, wood stoves, and motor vehicles. EPA is to publish an inventory of the emissions from these sources for 1988 and is to institute controls that will lead to phased reductions of the national total to a level 55 percent below the 1988 inventory. EPA's cost estimate of the area source provisions of the bill indicates that no additional costs will be imposed as the 55 percent reduction will be accomplished through implementation of the requirements in other titles (ozone attainment and mobile source controls, principally) and measures which the Agency has already planned for the control of toxic emissions from area sources. It should be noted that the Congressional Budget Office issued a cost estimate for title V which showed very large potential costs (approaching $11 billion annually) for the area source provisions. Although CBO is in agreement with EPA and CRS with respect to the costs of title V in the other three areas, this one item had the effect of significantly skewing the CBO maximum cost estimate of the whole title ($16 billion annually). However, even CBO acknowledges that these costs would only be attributable to title V, if all the other provisions of the bill and EPA's on-going air pollution control program were not successful implemented. It is unlikely that the national objective (which includes no hammer for failure to act) would become the controlling focus for the entire air program.

Finally, title V requires each facility handling any one of 55 extremely hazardous substances to prepare a hazard assessment describing the likely consequences of a range of accidental release events. EPA has estimated the cost of this provision at from $850 million to $1.35 billion. The estimate assumes that 70,000 small facilities would conduct assessments costing $5,000 and that 25,000 medium and large facilities would conduct assessments costing $20,000 to $40,000. The CBO cost estimate for this provision was much lower—$80 million. It is important to note that this is a one time cost, not an annual expenditure. Using EPA's high estimate and allocating it over the five years for this reauthorization, the projection used here is $300 million per year.

Paragraph 11(a) of Rule XXVI of the Standing Rules of the Senate requires that an estimate of the cost of the legislation as reported by the Committee be included in the report accompanying the legislation. The major provisions of each title and a Committee cost estimate follows.

Clean Air Act Amendments of 1987 Estimated Costs

[Annual costs in billions]

Provision cost	Estimated
Title I:	
Stage II Vapor Recovery	$0.40
Fleet Alternative Fuels	.12
RACT	1.90
Traffic Control	.19
Inspection/Maintenance	1.00
Title II:	
Acid Disposition Control Program:	
1993	5.3
1998	5.3
2000	5.3
2010	5.3
40 year NSPS requirement:	
1993	0
1998	0
2000	0
2010	1.5
Title III:	
Emission standards	1.10
Motorcycle standards	.01
Onboard Vapor Recovery	.50
Diesel Desulfurization	.40
RVP Limitation	.25
Oxygenates	.50
Solvents	.75
Municipal Incineration Program	.35
Title IV:	
NAAQS	[1].5
Title V:	
Technology-Based Standards Program	1.5
Area sources	0
Health-based standards	.3
Hazard assessment	.3

[1] Most of costs associated with review and promulgation of the standards is an ongoing agency activity.

HEARINGS

The Subcommittee on Environmental Protection held 13 days of hearings this year on the subjects of nonattainment issues, air toxics, acid rain issues including health effects, and municipal waste incinerators. Testimony was received from the Environmental Protection Agency, State and local agencies, members of the medical profession, industry representatives, and environmental groups.

The subcommittee held 3 days of markups on June 29, 30, and July 29, 1987; the full committee considered the bill as adopted by the subcommittee on September 16, 23, 25; October 2, 7, and 15, 1987. The bill was ordered reported on October 22, 1987.

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, November 12, 1987.

Hon. QUENTIN N. BURDICK,
Chairman, Committee on Environmental and Public Works,
U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for the Clean Air Standards Attainment Act of 1987.

If you wish further details on this estimate, we will be pleased to provide them.

With best wishes,

Sincerely,

ROBERT F. HALE
(For Edward M. Gramlich, Acting Director).

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

1. Bill number: Not yet assigned.
2. Bill title: Clean Air Standards Attainment Act of 1987.
3. Bill status: As ordered reported by the Senate Committee on Environment and Public Works, October 22, 1987.
4. Bill purpose: Title I would extend currently mandated deadlines for the attainment of ambient air quality standards pertaining to ozone and carbon monoxide. States would be permitted to submit revised implementation plans designed to achieve national standards by December 31, 1992. The bill would specify many of the elements the revised plan must include and would impose tighter sanctions on those areas or states that fail to comply with federal mandates or attain national standards. The Environmental Protection Agency (EPA) would review and approve the new plans, provide assistance and promulgate necessary guidelines and regulations. To support the development of revised plans, the bill would authorize the appropriation of $75 million for grants.

Title II would mandate new federal and state efforts to reduce emissions of sulfur dioxide and oxides of nitrogen by stated amounts in accordance with a specified schedule. The bill would prescribe average annual emissions standards to be achieved by states through the regulation of stationary sources. The EPA would be required to oversee, assist, and enforce state compliance measures and to promulgate revised emissions standards that reflects the bill's mandated goals.

This title would also encourage the deployment of clean coal technologies in the near term to reduce air pollutants that may be precursors of acid deposition. Section 193 would direct the Department of Energy (DOE) to carry out a program to construct and operate facilities that demonstrate the commercial deployment of clean coal technologies for use in electricity generation or industrial processes. Appropriations of $500 million a year would be authorized through 1992 for clean coal technology projects. The DOE and EPA would be directed to establish a Clean Coal Technologies Advisory Committee to advise on policy related to the control of air emissions that may be precursors of acid deposition, and on the selection of projects to be funded.

Title III would amend federal laws pertaining to emissions of air pollutants from mobile sources. The bill would specify standards for mobile source emissions of given substances and require the EPA to promulgate new rules to implement other provisions relating to fuel regulations and emissions testing. Under Section 306, the EPA would be directed to regulate emissions and ash disposal practices from municipal incinerators.

Title IV would require the EPA to promulgate new national primary and secondary ambient air quality standards for certain substances in accordance with a specified schedule. The agency would also be required to expedite its current activities and to make annual progress reports to the Congress.

Title V would amend Section 112 of the Clear Air Act to focus federal efforts on the regulation of hazardous air pollutants by categories of sources. This title would set specific goals for emissions reductions and would outline a comprehensive federal and state program that would include the use of permits to regulate stationary sources. Section 507 would create a new program to address catastrophic releases of hazardous air pollutants. Implementation measures would include the creation of an independent Chemical Safety and Hazards Investigation within the EPA to investigate chemical spills and advise the agency. For each year through 1992, appropriations of $25 million would be authorized to carry out the board's duties. For states wishing to assume responsibility for Title V activities, the bill would also authorize the appropriation of $35 million a year through 1982 for state grants.

5. Estimated cost to the federal government: The Clear Air Act expired at the end of fiscal year 1981. Since that time, funding for the federal clean air program has been authorized through agencywide short-term authorization acts. The table below shows the estimated budget impact of this bill, reflecting both the costs of continuing existing clear air programs for five years and the costs of additional programs and activities authorized or mandated by this bill.

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
For continuing existing clean air programs and activities:					
Estimated authorization level	193	202	211	220	228
Estimated outlays	113	174	198	214	222
For new programs and activities authorized or mandated by this bill—Estimated authorization level:					
Clean coal technology	500	500	500	500	500
Grants to States	110	35	35	35	35
Other	125	146	104	104	133
Total estimated authorization level	735	681	639	639	668
Estimated outlays	168	263	364	526	625

The costs of this bill fall within budget functions 300 and 270.

Basis of estimate: This cost estimate is based on the assumption that the full amounts necessary to implement the bill in accordance with all mandated deadlines would be appropriated for each fiscal year. Moreover, in developing this estimate, CBO has assumed that the ERA would be able to hire or otherwise acquire the personnel, consultants, and other resources necessary to carry out the expanded clean air program mandated by the bill.

For purposes of this estimate, the Clean Air Standards Attainment Act of 1987 is assumed to be enacted by January 1988. All estimated reflect CBO economic and technical assumptions and information obtained from the EPA and DOE.

Details by title are presented in the following pages.

Title I.—Many of the activities necessary to carry out Title I and related parts of Title III would be very similar to EPA responsibilities in the early years of the clean air program, such as the review of state implementation plans and the provision of guidance and technical assistance. Based on this earlier experience, spending in fiscal year 1988 for new EPA regulatory efforts is estimated to be about $18 million, rising to about $21 million in 1992. The 1988 authorization level also includes $75 million for state grants authorized under Section 105. The table below reflects the estimated costs that would be incurred by the EPA to carry out Titles I and related parts of Title III of the bill.

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Estimated authorization level	93	19	19	20	21
Estimated outlays	57	41	23	20	21

Title II.—This title would create a new acid precipitation program to be carried out by the EPA, the DOE, and the states. The estimated cost to carry out EPA regulatory activities and the DOE's clean coal technology program are shown below:

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Estimated authorization level	522	521	522	522	523
Estimated outlays	26	104	231	407	498

EPA regulatory activities are estimated to require annual funding of between $20 million and $23 million. An additional $1.5 million has been included for expenses relating to atmospheric field experiments required by section 203 and for other studies and reports covered under Title II. No costs for mandated international negotiations have been included because they are not expected to add significantly to the cost of the bill.

Annual appropriations of $500 million would be authorized through fiscal year 1992 to fund the clean coal technology program, including the creation of the Clean Coal Technologies Advisory Committee. Based on information from the DOE and the experience of similar government solicitations, CBO estimates that spending for clean coal projects (including operating costs) would be about $1.2 billion over the first five years. After 1992, an additional $1.3 billion would be spent. In addition, CBO has assumed that

DOE would not solicit or award funds for these demonstration projects until funds are appropriated. Outlay estimates for clean coal activities are based on the assumption that DOE would conduct five separate solicitations of $500 million each over the five-year period.

Title III.—Most of the mobile source requirements in Title III are not expected to add significantly to the EPA's ongoing program, and the costs of carrying out provisions that require additional efforts have been included in the table shown under Title I. The table below summarizes the estimated costs for other provisions in this title, such as the regulation of municipal incinerators and the creation of the new vehicle testing center required under Section 302.

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Estimated authorization level	4	2	3	3	3
Estimated outlays	3	2	3	3	3

The estimate includes funding of about $4 million over five years to establish and operate a new emissions testing center in a high-altitude area. Also, costs of about $2 million a year have been included to reflect the estimated incremental cost of implementing the bill's municipal incinerator program. While the ERA currently intends to regulate emissions for new and existing incinerators in the future, it would need increased funding in fiscal year 1988 in order to meet the bill's specified deadlines. CBO's estimate reflects the cost of expediting the promulgation of standards as well as the cost of creating a model training and certification program and promulgating rules for ash disposal.

Finally, about $1 million has been included in fiscal year 1988 for studies and reports required of the EPA under this title.

Title IV.—The enactment of Title IV would increase the EPA's abatement and control budget by requiring specific procedures to be used in national ambient air quality standards. In addition, the bill would force the EPA to either promulgate primary and secondary standards for certain substances or decide that they are unnecessary, all within a specified timetable. In order to carry out this work, the EPA would also have to increase spending on research activities that support the development of criteria documents. The table below shows the estimated cost of implementing Title IV.

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Estimated authorization level	8	9	10	10	11
Estimated outlays	3	7	8	9	10

This estimate is based on the assumption that about 60 percent of the costs would be borne by the EPA's Office of Research and Development, which would require about $28 million over five years to develop the necessary basis for abatement and control efforts. Most of this amount would be spent for extramural support.

Title V.—Under this bill, the EPA would assess and regulate hazardous air pollutants by focusing on the sources that emit them and by setting standards on the basis of available technology. In addition, the bill would require the EPA to accelerate its activities greatly to meet specific deadlines for both new mandates and those already being carried out. If the EPA is to meet the bill's requirements, it would need to increase spending for hazardous air activities by the following amounts:

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Estimated authorization level	108	130	85	84	110
Estimated outlays	79	109	99	87	93

Based on the list of air pollutants referenced in Section 502, CBO estimates that the EPA would need additional appropriations of about $74 million within the first five years of enactment to promulgate source emissions standards in accordance with the bill's deadlines. After 1992, another $56 million would have to be appropriated to complete this activity. Costs for standard-setting may be higher or lower, depending on the number of substances and sources that are ultimately listed and regulated. Also, this estimate is based on the assumption that the EPA would be able to minimize its workload by consolidating several pollutants into one source standard. If this is not possible, costs would be much higher. For example, if the agency were forced to set one standard per source for each pollutant listed, costs could exceed $200 million in the first five years alone.

The table also includes the estimated cost of developing a national inventory of emissions from area sources and the estimated federal cost to achieve mandated reductions in the inventory through the issuance of source permits. Assuming that all states accept delegation of permitting activities, the EPA would require additional funding of about $37 million in 1988 and $39 million in 1989 to develop the inventory and to begin implementation of a state permitting process. In later years, federal activities would focus on state oversight and enforcement, which is estimated to cost between $9 million and $10 million a year. If any state does not accept or fulfill delegated responsibilities, federal costs would be higher. State grants under Section 505 are assumed to be funded at the authorized $35 million annually.

Finally, annual funding requirements for the catastrophic release program, including $25 million a year for advisory board activities, are estimated to be about $33 million to $34 million through 1992.

The above estimates include the cost of enforcement efforts and contractor support where necessary. Estimates for standard-setting reflect potential savings that may be realized because of the bill's shift to technology-based standards.

6. Estimated cost to State and local Governments: Enactment of this legislation would entail significant additional costs for state and local governments. While CBO was able to estimate the likely costs of some parts of the bill, it has not been possible in the time available to quantify its total impact. Estimating these costs is complicated by uncertainty about how various provisions would be implemented and what would occur in the absence of this bill. Under the bill, state and local governments would gain an extension of the existing deadline for attainment of federal ambient air quality standards, and therefore avoid possible sanctions. On the other hand, they would be required to implement a number of specific control strategies to attain those standards, which would require additional expenditures. The bill includes new emission limitations for stationary sources, which would lead to additional state costs for planning and enforcement. Also, provisions relating to municipal waste incinerator facilities would require expenditures by municipalities for retrofitting existing facilities or including additional controls on new ones, as well as for monitoring emissions and disposing of ash.

Nonattainment areas.—Title I would extend the deadline in the Clean Air Act for attainment of ozone and carbon monoxide standards, but would compel states to submit revised implementation plans conforming to more exacting requirements. The bill would authorize $75 million for grants to states for this planning process, but would provide no new federal funding for implementation. CBO expects these provisions to result in increased costs to state and local governments, with the largest potential costs for vehicle inspection and maintenance programs in nonattainment areas. However, we cannot quantify those costs, because the consequences under current law and under this bill are both highly uncertain.

Under current law, a number of areas may be subject to sanctions as a result of their failure to achieve federal clean air standards by December 31, 1987. This bill would give states that made good faith efforts to comply with existing requirements until December 31, 1992 to reach federal standards. Areas with very severe air quality standards would be given additional time to reach attainment. In the absence of such an extension, it appears unlikely that the EPA would immediately impose any sanctions on such a nonattainment area, other than a ban on permits for new major sources. Title I would also provide for sanctions if these extended deadlines are not met, including cutoff of federal highway funds for nonattainment areas, restrictions on additions to sewage treatment facilities and a similar ban on new stationary sources. The EPA Administrator would still retain some discretion in implementing these sanctions.

In return for an extension of the deadline, states would be required to include several specific control elements in their revised implementation plans. These would include vehicle emission control inspection and maintenance programs, gasoline vapor recovery systems, and a schedule for requiring the use of alternative fuels or power sources with low emission characteristics for fleet vehicles. In addition, these amendments would require that smaller stationary sources be included under local enforcement of emissions standards. Areas that cannot attain federal standards by December

31, 1992 would be subject to even more stringent requirements, including mandated traffic control measures, which could involve substantial costs. Some of the controls mandated by this bill may be required by the EPA in the absence of new legislation, or may be established by state and local governments in any case.

Title I would expand the number of jurisdictions required to have vehicle inspection and maintenance programs. It would also expand the scope of those programs, beyond what is currently required, or likely to be required under current law. Most of the areas likely to be nonattainment areas already have some form of inspection and maintenance program, but most of them would probably have to expand their programs in at least one of several ways as a result of this new requirement. For example, existing programs generally test for hydrocarbons and carbon monoxide emissions, but Title I would mandate tests for oxides of nitrogen and diesel particulates. Programs would also have to expand to cover more jurisdiction and types of vehicles, including heavy duty gasoline and diesel vehicles.

Based on information provided by EPA, CBO estimates that the added annual costs could reach about $900 million, in addition to an initial investment in new equipment—possibly as much as $1.5 billion to $2.0 billion. The private sector would bear much of this additional cost, however, and at least a portion of the costs would be covered by fees paid by vehicle owners. In many states, inspection and maintenance programs are decentralized and operated by garages; therefore most inspection costs are currently non-governmental. Title I would require programs to be operated on a centralized or, with respect to emission testing, computerized basis. This would probably increase the number of inspections conducted directly by state or local governments or by contractors. In either case, some of these additional costs could be recovered through increased fees, but CBO cannot predict the extent to which state and local governments would choose to do this.

Other control elements mandated by Title I would probably necessitate increases in state and local enforcement and administrative personnel. For example, requirements for gasoline vapor recovery systems and regulation of smaller emissions sources would require additional staff time. The incremental cost of these mandates is impossible to measure, however, due to uncertainty as to how they would be implemented and how many areas would eventually institute these measures under current law.

The cost of all these control measure would be partially offset by additional revenues. For example, traffic control measures mandated for some areas could produce increased revenues from fines or permits. In areas with severe air quality problems, this bill would require the adoption and enforcement of fees and excess emissions penalties charged to stationary sources, based on the volume of pollutants emitted.

Acid deposition control.—Title II would require states to ensure that specific reductions in the amount of nitrogen oxide and sulfur dioxide emitted from certain major stationary sources are made according to time schedules set in the bill. States would also be required to adopt additional enforcement measures to ensure that specific annual reductions in the level of total statewide emissions are achieved. Enforcement measures, as incorporated in statewide plans, must include source-specific reduction requirements. Plans would have to be completed and submitted to the EPA within two years of the bill's enactment.

Based on information from a number of states, CBO estimates that enactment of Title II would result in additional annual costs to state governments totaling $15 million to $20 million. These costs would be incurred primarily for plan development and industry monitoring and enforcement.

Municipal waste incinerators.—Title III would require the EPA Administrator to promulgate, within one year, emission limitations for new and existing municipal waste incinerators. New incinerators would be required to use the best available control technologies and practices, including scrubbers, high efficiency particulate controls (fabric filtration or electrostatic precipitators), and good combustion practices to meet the standards established in the bill. Existing facilities would be required to use similar technologies, but could achieve less stringent levels for certain emissions. The bill would also require the Administrator to promulgate regulations for the disposal of municipal waste incinerator ash, the monitoring and reporting of emissions by incinerator owners or operators, and the preparation of state solid waste plans consistent with these requirements. Costs of the bill to states and localities will depend on how the regulations are written and will vary from facility to facility depending on the size, type, extent to which they are already complying with the bill's requirements, and other characteristics of the facility.

For existing municipal waste incineration facilities, the EPA has issued guidelines and an advance notice of proposed rulemaking for emission control technologies and practices similar to those required in the bill, and intends to issue guidelines in final form by December 1990. This bill would require the Administrator to promulgate such regulations within one year after enactment, and would require the affected facilities to comply with the standards within 18 months after enactment. Currently, out of approximately 110 existing units, only one or two would meet the standards in the bill. Based on information provided by the EPA, CBO estimates that the aggregate annualized cost to municipalities of retrofitting the remaining existing facilities to meet particulate matter standards similar to those included in the bill would be between $10 million and $200 million per year. These costs do not include the potential one-time costs and forgone revenues associated with shutting down a facility to do the retrofitting, which could be several hundred million dollars if all facilities experienced these costs. Based on information provided by the National Conference of Mayors, it appears that approximately one-fourth of existing facilities will be 20 years or older by the mid-1990s. Such facilities may be unable to meet the standards set out in the bill. The communities served by these facilities would thus likely incur similar or greater costs in finding and using alternative waste facilities, possibly including building new waste incineration units.

The EPA has already taken regulatory action affecting new municipal waste incinerators that is designed to achieve compliance with standards similar to those in the bill. The EPA recently proposed guidance for the permitting of new facilities, and intends to issue regulations affecting these facilities in November 1989. The bill would require the Administrator to promulgate regulations within one year after enactment, and would require new facilities to comply with those regulations upon commencement of operation or within 18 months after enactment. Based on information provided by the EPA, CBO estimates that the aggregate annualized cost to municipalities for retrofitting or including extra controls (usually dry scrubbers) on the approximately 200 facilities that are permitted, under construction, or planned to come on-line by the mid-1990s to achieve standards similar to those in the bill would be approximately $300 million per year. To the extent that some of these facilities would have included dry scrubbers anyway, the added cost would be less. In addition to these capital costs, municipalities may incur higher financing costs to support such facilities than they would have otherwise because of the risk associated with the requirement that EPA review and revise its standards every five years.

In conjunction with controlling emissions, the bill calls for the regulations to include requirements for continuous monitoring by incinerator owners or operators of certain emissions, and periodic monitoring, no less frequently than every 6 months (18 months if compliance with emission standards is maintained), for other emissions. The incremental costs resulting from these requirements are difficult to identify because while most states already require monitoring for many of the specified emissions, the standards they are monitoring for may be different from those in the bill. New testing requirements, however, may be costly; for example, continuously monitoring a facility for the pollutants specified in the bill may cost between $100,000 and $200,000 annually, and monitoring a facility for dioxins may cost between $50,000 and $150,000 per test. Based on information provided by the National Conference of Mayors, we estimate that total testing costs for each facility meeting the requirements of this bill may range between $250,000 and $500,000 a year.

The bill also would require the Administrator to promulgate regulations within one year after enactment for the testing, handling, and disposal of ash from municipal incinerators. At present, the EPA has no plans to issue regulations on the subject. These disposal requirements would require a change in operations and additional costs for most municipalities with waste incinerators. Currently, almost all such municipalities co-dispose of incinerator ash along with other solid waste. The bill would require the use of monofills with single liners for ash only, or double-lined systems for ash disposal within other landfills, together with groundwater monitoring. Some ash could be disposed of in sanitary landfills, but only after chemical treatment and only if it met certain standards. Based on information provided by the National Conference of Mayors, we estimate that the cost to a municipality of building disposal systems that comply with the requirements of this bill could be $4 million to $6 million over the first five years for an average facility. Testing of ash residue could also cost about $100,000 per year.

States and localities may be subject to a variety of other costs resulting from this bill. For one, they will likely incur additional administrative costs in developing and enforcing revised solid waste disposal plans in accordance with the regulations required by this bill. Municipalities may incur significant additional costs in complying with guidelines that the EPA would be required to publish within one year after enactment for removal of certain items or materials prior to incineration. States may incur additional costs in implementing training and certification programs that meet federal standards for municipal waste incinerator personnel. All these costs will depend on how waste facilities are affected.

7. Estimate comparison: None.
8. Previous CBO estimate: None.
9. Estimate prepared by: Deborah Reis, Marjorie Miller, Carol Cohen, and Kim Cawley.
10. Estimate approved by: C.G. Nuckols (for James L. Blum, Assistant Director for Budget Analysis).

ADDITIONAL VIEWS OF MR. BREAUX

John Breaux

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The Committee on Environment and Public Works has spent the better part of 1987 considering controversial amendments to one of the most far-reaching environmental statutes under its jurisdiction, the Clean Air Act. Hours have been spent receiving testimony regarding the strengths and weaknesses of the existing law and the advisability of proposed amendments to that law. The Committee has now voted to report this legislation to the full Senate, and I must confess that my feelings with regard to this proposal are mixed.

I voted to report the Committee bill because I believe that the Congress has a responsibility to update the Clean Air Act in a constructive fashion that will strengthen our attack on air pollution in this country. In my view, the Committee product provides a starting point for crafting workable improvements that can garner the broad support needed if amendments to the Act are to become law. However, many of the specific provisions of the Committee bill will undoubtedly require revision in order for this bill to achieve that level of support and provide credible solutions to our air quality problems.

The scope of the Committee bill is extraordinary. Provisions of the bill attempt to deal with the pressing issue of the failure of our cities to reach the national standards for ozone and carbon monoxide. Detailed new standards that push or exceed the limits of technology are spelled out for emissions sources ranging from motorcycles to municipal incinerators. The Committee has tackled, albiet in an unnecessarily complex and bureaucratic fashion, the serious problem of emissions of toxic air pollutants. Costly provisions are included to dramatically and rapidly decrease emissions of sulfur dioxide and oxides of nitrogen, precursors of acid rain. The bill has engendered fierce, and in some cases deserved, opposition from virtually every major industrial segment of our society.

While not wishing to minimize the difficulties that remain with the Committee bill, I do want to emphasize that many of these problems are a matter of degree. That is, many of the broad policy choices we made in Committee are proper in my view, with differences emerging with respect to the details of how these policy choices can be most effectively, fairly, and inexpensively implemented. For example, Title I of the bill sets out an ambitious program to bring so-called non-attainment areas not currently in compliance with national ambient air quality standards into attainment in accordance with specific time tables. The bill rightly recognizes that areas with the most serious air quality problems will require a longer time period and more stringent controls to reach attainment than will areas with less severe problems. Further, the bill pushes EPA to take a more active role in ensuring attainment of the standards through, for example, development of new technical guidance for the states on how particular categories of sources of pollutants may be best controlled. The bill also attempts to deal with the significant problem of interstate transport of air pollutants which can lead to the failure of a downwind state to achieve the standards as a result of emissions in upwind states.

Policy choices of the sort I have outlined above are wholly proper and are essential elements that I believe must be addressed if we are to make real progress in correcting air quality problems. However, in implementing these and other policy choices the Committee bill would eliminate discretion badly needed at all levels of government to identify the specific control requirements necessary to bring non-attainment areas into compliance as quickly and with as little unnecessary economic and social disruption as reasonably possible. In its zeal to correct the problems, the Committee has, for all the right reasons, nonetheless created a needlessly cumbersome and inflexible system that too often substitutes Congressional judgment for the sound technical and scientific basis that is the cornerstone of credible environmental regulation.

I am frankly disturbed by the bill's cynical view that government at all levels is unwilling to act in the best interests of the public, and by the sweeping departure of the bill from a central tenet regarding the appropriate role of science in U.S. environmental policy. This legislation is driven by the premise that federal, state, and local governments will not act to protect public health and environmental quality from the effects of air pollution except under the most coercive of circumstances. In particular, the inference to be drawn is that state and local governments are populated by spineless politicians and weak-kneed bureaucrats who lack the political will to take necessary action. If this were so, then perhaps it would be time for Congress to flatly eliminate any pretext of non-federal responsibility for air quality, rather than attempting to create a system that provides the illusion, but not the substance, of active state and local participation in decision making.

This is not to pretend that government has done all it should to meet the challenge of protecting our air quality. The failures of some states and localities to act responsibly are real, just as there is blame to be placed on the doorstep of the Environmental Protection Agency for failing to provide aggressive leadership on air quality issues. Even Congress has been known to look the other way rather than make some of the difficult decisions necessary to correct these shortcomings. But these failures have so distorted perceptions that this bill responds by inappropriately short-circuiting basic relationships and processes. The bill flatly eliminates much of the discretion of elected officials and administrators at all levels to tailor approaches that best fit the circumstances of a community. And in response to the mistakes of the past, the bill provides a recipe for the mistakes of the future by mandating compliance with specific, detailed, and highly technical standards without the benefit of subjecting these standards to the rigors of the regulatory process.

Clean air will not result simply from Congressional fiat, but rather will involve a series of sometimes painful steps and fundamental changes in the way we live our lives within our technologically sophisticated society. I think it is necessary that we maintain the primacy of science in developing solutions to air quality problems, and that we genuinely preserve a basic operational aspect of the Clean Air Act. A fundamental premise of existing law is that state and local governments must be responsible partners with the federal government in addressing air quality issues. State and local governments are more directly responsive to the public and more competent to address the specific local circumstances faced in their communities than are federal agencies or the U.S. Congress. Congress should provide strong policy directives, and the Environmental Protection Agency should provide active guidance, support and technical assistance to state and local governments in overseeing the implementation of those policies. The solution frequently prescribed in this bill, however, is for the Congress to dictate specific pollution control requirements for individual communities and to specify detailed numerical standards that the Congress is simply not competent to address.

The air quality problems of Baton Rouge, Denver, New York, Los Angeles and elsewhere are all too real and demand our attention. But the problems of these areas are also very different and demand the flexibility which will encourage innovative and targeted solutions. Flexibility and discretion are being wrongly discarded by the Committee because these important tools have been abused by some. The challenge for the Congress, however, is to strengthen federal support and to develop policies that minimize the opportunity for abuse, not to simply eliminate options. We cannot resolve technically complex problems with a simplistic cookie-cutter approach that either ties the hands of those charged with the well-being of their communities or allows any level of government to shirk its responsibilities.

The Senate will undoubtedly grapple with a variety of thorny issues should this legislation reach the Floor, but among the most basic and significant must be the issues of fairness and balance. The American public deserves and rightfully demands a healthful environment, and there is no disputing that strong regulatory programs have an important role to play in protecting public health and environmental quality. I do not believe a credible case can be made for failing to improve and strengthen existing federal law governing air pollution. But there is a difference between an aggressive regulatory program that is fair and one that is arbitrary or punitive. There is a difference between a strong regulatory program that is balanced and one that is so prescriptive and narrow in its approach that it precludes or greatly limits the opportunity for innovative and cost-effective solutions that are tailored to the real challenges we face in different areas around our country.

There are several specific issues I would like to touch upon in these comments that I believe are illustrative of the problems which remain with this bill. While by no means an exhaustive list, these specific issues are among those brought to the attention of the Committee which, in my view, the Committee failed to resolve satisfactorily.

Diesel Fuel Desulfurization

This example is illustrative of the unwarranted specificity of the legislation. EPA has promulgated standards for emissions of particulate matter from heavy-duty engines which are to take effect in 1991, and ratchet to a lower level in 1994. Reductions in these emissions could be accomplished in a variety of ways, including a reduction in the sulfur content in diesel fuel, design modifications for heavy duty engines, application of particulate "traps" in engine exhaust systems, or through some combination of approaches. Obviously, these various control strategies would differ in cost, and the distribution of those costs varies with the strategy selected.

As originally drafted, the Committee bill would have simply banned the sale of diesel fuel with a sulfur content in excess of 0.05 percent after July 1, 1990. This sulfur level reflects about a five-fold decrease in the average sulfur content of diesel fuel currently sold in the U.S. The process of removing this sulfur from the fuel during refining could actually increase refinery emissions of hydrocarbons and other compounds, and would result in enormous capital and operational costs to the refining industry. Industry estimates were about $3.3 billion in capital outlays, and about $1.2 billion in annual additional operating costs. Of course, the industry will pass these costs along to industrial users, farmers, truckers, and other consumers in the form of higher costs for diesel fuel and home heating oil.

Despite the fact that EPA has been moving forward with a review of the options for controlling particulate emissions and the proper level and mix of fuel and engine modifications, the Committee insisted on including in the bill a slightly amended but equally arbitrary provision, the technical merits of which the Committee is ill-equipped to judge. During Full Committee markup, the Committee approved an amendment, without benefit of a hearing or prior review by the Members, that delayed the prohibition on the sale of diesel fuel in excess of 0.05 percent sulfur until 1993 for "small" refineries only, but did not affect the provision for other refiners. The amendment also included a requirement that EPA report to Congress within 6 months after this provision became law on whether a 0.05 percent standard is necessary, although the amendment provides no automatic mechanism for altering the standard should Congress discover that it has acted in error.

The National Petroleum Refiners Association testified in June that planning and construction for desulfurization facilities could reasonably take 4 or more years. Since it appears that it will be well into 1988 before this legislation could be enacted, it would be virtually impossible for major refiners to develop the capacity to produce desulfurized fuel by the 1990 deadline. Further, other portions of the Committee bill set a variety of new requirements for permitting of plant modifications in nonattainment areas. With the new requirements, such as larger emissions offset ratios, serious questions are raised as to whether any refinery in a nonattainment area - and there are literally scores of these refineries - would be able to obtain the permits necessary to construct the desulfurization capacity.

In short, the Committee has unfortunately insisted on dictating a specific standard that it is unable to document is the proper standard. The Committee provision sets an arbitrary sulfur level; disrupts efforts to determine the best technologic and economic mix of strategies to control particulate emissions; creates an artificial distinction between "small" and larger refiners; insists on deadlines that are impossibly short and create inordinate expense; and attempts to cover its tracks with a study that will tell Congress after the fact whether it has divined the proper numerical standard, but brings with it no obligation to make a correction if we have erred. A provision of this kind reflects poorly on the Committee and does nothing to enhance the credibility of the Committee bill as a whole.

Outer Continental Shelf Regulation

I doubt that an executive agency has been more roundly criticized by a Congressional Committee than was the Environmental Protection Agency over the past 10 months for its perceived failures and shortcomings in handling programs under the Clean Air Act. It is indeed ironic, therefore, that the Committee has decided that among federal agencies only the EPA is competent to address air quality issues associated with outer continental shelf (OCS) oil and gas exploration and development.

Under the OCS Lands Act (OCSLA) Amendments of 1978, the Secretary of the Interior, who administers the OCS program, is required to prescribe regulations "...for compliance with the national ambient air quality standards pursuant to the Clean Air Act...*to the extent that activities under this Act significantly affect the air quality of any State.*" (emphasis added). The Statement of Managers accompanying the OSCLA amendments makes it clear that regulations for OCS facilities are to ensure that offshore facilities *do not* prevent the attainment or maintenance of an onshore air quality standard, even if a state chooses to include air quality standards in its state plan that are more stringent than the national standards.

State and local opponents of OCS development have fought such development despite the clear recognition by Congress that the extraction of oil and gas resources on the federal OCS is in the national interest. In 1981, the State of California filed suit against the Department of the Interior, based on the contention that inadequate regulation by the Department was aggravating existing ozone non-attainment problems along the southern coastal areas of the State. After protracted legal action, the State, Interior, industry, and environmental groups began discussions last year, with the consent of the court, to develop a negotiated rulemaking to resolve the outstanding issues and develop new regulations to govern operations on the California OCS. These negotiations have progressed to the point that a draft rule has been circulated to all parties, and meetings to resolve outstanding issues have taken place as recently as November 20, 1987.

The provision included in the Committee bill is unnecessary, would negate the progress made in the negotiated rulemaking and, perhaps most importantly, would significantly enhance the opportunity for state and local interests opposed to development of resources on the federal lands of the OCS to impede or halt such development under the guise of protecting air quality. The rights of States with respect to the offshore development of federal lands are already clearly spelled out and protected in the OCSLA amendments. The Committee provision is ill-considered and makes sweeping and unwise changes in the functioning of the OCS program nationwide in response to a situation in California which is being addressed constructively under current law. The changes are unnecessary to protect air quality but have the potential for profound effects on the future energy security of the U.S.

Sanctions for Nonattainment

The provision of the Committee bill regarding the imposition of sanctions for nonattainment is a glaring example of a senselessly punitive provision that does nothing to improve air quality. It is, in my view, a slap in the face to those state and local governments that are actively working to bring their areas into compliance with the national standards.

There is broad agreement that areas that fail to develop an approved plan for reaching the attainment goal should be subject to sanctions. Likewise, if an area has developed a plan but fails to implement it in a timely fashion, sanctions are an appropriate response. But what of areas that act responsibly in developing a plan, which EPA agrees should bring the area into attainment, and that act aggressively to implement that plan, but still fail to reach the attainment target? Is it fair to those communities to punish them?

Predicting measures necessary to reach attainment is no simple matter for either carbon monoxide or, particularly, for ozone. We are asking these communities to look into the future and predict growth patterns, highway usage, and changes in economic conditions and industrial processes that affect emissions. We ask them to predict with certainty the emission reductions that will result from the various pollution control measures these communities have or will implement. We ask them to predict the effect on emissions of measures that the federal government will implement. We ask them to take into account the transport of pollutants from adjacent regions. Perhaps most difficult of all, we ask them to predict poorly understood atmospheric and climatic conditions and processes that, combined with emissions, result in the photochemical reactions that produce ozone.

Having asked these states and communities to predict with certainty a highly variable and dynamic system, we then proceed to penalize them for failure to succeed in achieving the attainment target. Having acted responsibly and in good faith, having worked hand in hand with the federal government every step of the way, the Committee bill punishes these communities for a failure they sought to avoid. We will impose a ban on construction of various types and we will eliminate funds for highway programs. Communities that miss the attainment target, despite truly good faith efforts, should rightly take on additional control measures to reach attainment. But they ought not to be punished.

The Committee bill does provides a "good faith" waiver or delay from the sanctions. However, I cannot fault state and local governments that respond to this less than helpful language with great concern. Under the Committee bill, a locality can conceivably escape the sanctions for failure to reach attainment but does so at an extraordinary price. Assuming an area can demonstrate that it has acted in "good faith", it must take upon itself an extensive and detailed menu of controls dictated in the bill which, if the area has indeed acted in good faith, ought to go far beyond those actually required to bring the area into attainment.

This is expensive and distasteful overkill, but the most egregious aspect of the provision is yet to come. Under the bill, the definition of "major sources" of emissions is changed from those sources emitting 100 tons per year or more of emissions (current law) to 25 tons per year. This redefinition greatly increases the number of small emission sources subject to reasonably available control technology (RACT), lowest achievable emission rate (LAER) standards, and other significant regulatory provisions of the bill. A final feature of the Committee approved "good faith" sanctions provision is a further redefinition of "major sources" to include those sources which produce as little as 10 tons per year of emissions. Thus, an area that has acted in good faith but missed its attainment target would be required to regulate "major sources" to a level below that required in any other area of the country. This feature unnecessarily penalizes some very small emission sources and greatly complicates and expands the permitting and regulatory burden for administrators without the likelihood of commensurate reductions in emissions. The prospect of an area that only slightly exceeds the attainment goal a few years from now being forced to regulate myriad small sources that even an area grossly out of compliance, such as Los Angeles, is not required to regulate strains credulity as a national policy. This serves no legitimate air quality purpose, and can only be described as punitive.

I am anxious for the full Senate to confront these and other issues directly. For too long the Congress has been unwilling or unable to accept the challenge of revisiting one of our most complex and contentious environmental statutes, one that is dramatic in the degree of polarization it engenders and is characterized by all the subtlety of a street fight. While problems remain with the Committee bill, I commend the leaders and members of the Environment and Public Works Committee for their fortitude in venturing into this lion's den. I certainly urge my colleagues to address these difficult issues in a straightforward and timely fashion. It is only by confronting the difficulties that they can be resolved. And these issues must be resolved for a bill that talks tough but fails to be enacted into law does nothing to improve the quality our air.

ADDITIONAL VIEWS OF MR. SIMPSON

In recent years, the Environment and Public Works Committee has often taken action on amendments to the Clean Air Act without much regard for the prospects for Senate passage of this legislation. As a result, Congress has spent seven years working on Clean Air Act amendments without successfully addressing the problem of acid rain or ozone non-attainment. Congress has not passed clean air legislation for the past seven years because of the legislative grid-lock that has resulted from the polarization stoked by the various interest groups on all sides of the issue.

In an effort to actually pass clean air legislation this year, Senator Proxmire and I and a number of our colleagues worked with the Governors Alliance for Acid Rain Control and other individuals interested in getting floor action on clean air in order to develop a cost effective compromise bill to control acid rain precursor emissions. This bill -- S. 316 -- would require a flexible, two-phased 10 million ton reduction in sulfur dioxide emissions and has served as the basis of extensive negotiations between Senator Mitchell and me during consideration of the Clean Air Act amendments by the Environment Committee. These negotiations were designed to produce a bill that can enjoy broad support on the Senate floor. Unfortunately, these negotiations were not concluded before the Committee reported a bill.

I have been encouraged by the progress of my negotiations with Senator Mitchell and others and know that Senator Mitchell shares my commitment to developing a bill that can appeal to a broad cross section of the Senate. Several of the amendments adopted in committee have moved this bill closer to the goal of receiving widespread support. In particular, the adoption of a phased approach to sulfur dioxide reductions, similar to that found in the Simpson-Proxmire bill, is a major improvement in the bill. The revised bill includes changes adopted to the nitrogen oxide emissions reduction requirements which strengthen the bill by achieving the same environmental results for half the cost of the original bill's nitrogen oxide provisions. While our negotiations have produced some positive results, more needs to be done in order to ensure that a bill can become law during this session of Congress.

Unfortunately, I am not able to support the bill that was reported by the committee because I believe it has many fundamental flaws. I did vote for committee passage of the bill because I believe it is critically important to get the bill out of committee so that Senators representing the Midwest and other regions of the country can have some proper input into the legislative process. Many changes are needed in the Committee bill before it can be adopted by the Senate and I trust Senator Mitchell will continue to be open to the need for change.

There has been much talk recently that Congress must pass acid rain legislation in order to protect the health of our children. Public health is always an important factor when we consider clean air legislation. However, I would note that there are no peer reviewed studies to indicate that SO2 emissions are causing increased hospital admissions. Those who promote acid rain control in order to protect human health are misguided or they are trying to add an element of emotion to the acid rain issue. The reason we have not passed acid rain legislation for ten years is because too much emotion and not enough reason have polarized the debate. If we are to proceed successfully, let us proceed from a basis of fact, not fear, guilt or emotion.

ACID RAIN PROVISIONS

One of the largest remaining problems with the Committee bill lies in the size of the reduction in the sulfur dioxide emissions required. Sections 181 and 182 of the bill require a 12 million ton sulfur dioxide reduction below 1980 levels to be achieved by the year 2000. A simple 12 million ton reduction would more than double the $2.6 billion annual price tag associated with a 10 million ton reduction package that I have proposed. To make matters worse, the provisions of Section 183 effectively force the use of costly scrubbers on roughly two-thirds of the existing power plants in this country and preclude other options such as the use of natural gas, fuel switching, clean coal, or other strategies. The combined effect of the bill's SO2 provisions will be to require an annual SO2 reduction of 15 million tons by the year 2010, thus pushing the cost of the bill over the $10 billion mark on an annual basis by 2010. This is more than four times the cost of the Simpson-Proxmire bill and translates into rate increases greater than 20 percent to electricity consumers in many states. I am sure that many of my colleagues would find the prospects of such rate increases abhorrent.

Acid rain is a serious environmental problem that needs to be addressed by Congress. I remain flexible on the absolute tonnage level that is required, but a 10 million ton sulfur dioxide reduction approximates the raw 50 percent reduction and deposition recommended by the National Academy of Sciences several years ago. In addition, there is no concrete scientific evidence that demonstrates that a 12 million ton bill will produce significant additional environmental benefits over a 10 million ton reduction. We do know that current analysis shows the Committee bill will quadruple the cost to consumers for acid rain control over the Proxmire-Simpson bill. That is why I believe the SO2 reduction target needs to be reduced from the 12 million ton figure.

LIMITS TO GROWTH

The Committee bill requires that emissions from any new power plant be added to the total emissions reduction a state must achieve in each phase of the program. This overzealous provision effectively discourages the construction of new power plants, increases the cost of the control program, and creates a new obstacle to economic growth. While I believe it makes good sense to prohibit any future increases in emissions from old, dirty plants that will have been cleaned up as part of the acid rain program, this does not make sense for new plants which must meet very stringent New Source Performance Standards (NSPS). New power plants currently are required to meet NSPS, which forces the use of scrubbers in most cases. The ICF and EPA project that all new units slated to come on line nationally by the year 2000 will add just 400,000 tons to the nation's SO2 inventory. Yet, any bill that would require offsets from the small increases can be exceedingly expensive and will be focused disproportionately in clean western central and gulf coast states. In addition, the current Clean Air Act requires EPA to revise and tighten the NSPS periodically as improvements in control technology appear. In short, we need to add a provision to the bill explicitly exempting new plants from the requirements of the acid rain title of the Committee bill.

ADDITIONAL REQUIREMENTS FOR OLD PLANTS

Unlike some other air pollution problems, acid rain is a regional and localized problem. Acid rain is created by chemical transformation in the atmosphere of sulfur dioxide and nitrogen dioxide emissions. The emissions from any one plant are not critical, but the total amount of sulfur dioxide and nitrogen oxides released into the atmosphere is very important. As a result, the strategy for cleaning up the problem can and must be a broad and flexible one. We need to reduce overall atmospheric loading of sulfur dioxide, not the emissions from any one particular plant. The Committee bill begins with a flexible reduction requirement allowing states to choose how and where they will require cuts in emissions. This flexible approach, also found in the Simpson-Proxmire bill, is important because it means we can achieve the same environmental result at a much lower cost to the consumers. Rather than forcing every plant to meet a single standard, we can target those plants where reductions are least expensive and save consumers significant rate charges while achieving the same level of environmental benefits. Unfortunately, Section 183 of the Committee bill undermines this valuable flexibility by establishing two additional plant-specific requirements:

1. When a plant reaches 30 years of age, it must meet a plant specific .9 lbs. per million Btu's emission rate or the state must find offsetting reductions;

2. When a plant reaches 40 years of age, it must comply with NSPS requirement and install an expensive scrubber.

These two unfortunate provisions greatly increase the cost of the control program without providing significant additional environmental benefits. In addition, the second provision which requires a 40-year-old plant to meet NSPS discourages the development of clean coal technology and the use of other fuels by locking in the use of expensive scrubbers on old plants. Both the 30 year/.9 lb. and the 40 year/NSPS requirements in Section 183 need to be stricken from the bill before it reaches the Senate floor.

STATES WITH WELL CONTROLLED EMISSIONS

In response to concerns from Western members and members with state-approved acid rain control programs, the Committee bill includes a provision easing slightly the SO2 emissions reduction requirements for states that are relatively clean. It falls short of the mark, in that it fails to recognize that requiring additional SO2 emissions reductions from already very clean western states is not needed. Western states uniformly burn low sulfur coal in plants equipped with controls and are responsible collectively for only a small portion of the nation's total utility emissions. The combination of low emission and great distance from the area sensitive to acid deposition is a strong case for exempting western states from the sulfur dioxide requirements of the bill. For instance, my state of Wyoming has a standard of .2 lbs. of SO2 per million Btu's -- which is one of the strongest standards in the United States and exceeds the federal standard by six times. Residents of Wyoming should not be required to pay for emissions reductions which will benefit midwestern and eastern states when they have already footed the bill for removing pollution from the air.

The only exception to this argument is with regard to nitrogen oxide emissions. In the west and central states, nitrogen oxide emissions may be a growing problem for sensitive forest areas. The Committee bill has been adjusted to ensure that nitrogen oxide emissions will be reduced in western states as well as states in the 31 state acid rain region. However, the Committee bill does not deal well with the SO2 requirements for clean states and Section 182 (b)(2)(F), dealing with well-controlled states, must be replaced with a more explicit exemption for western states where SO2 is concerned. The provision dealing with reduction of nitrogen oxide in western states should be retained.

ACID RAIN PROVISION COSTS

I have requested EPA and ICF to conduct a computer analysis of the completed Committee bill and would take this opportunity to share some of the conclusions of this analysis. The EPA/ICF study determined that the revised Mitchell bill as reported from the Committee would have "a different pattern of utility emissions reductions and utility costs over time than the earlier version of the bill. In the near term (1993-1995), there would be some interim emission reductions and costs (versus none required in the previous bill); in the intermediate (1996-1999) emission reductions in cost would be lower; and in the long run (after 2000) emission reductions and costs would be somewhat higher. The net effect would be slightly less utility SO2 reductions in cumulative terms between 1993 and 2010 (207 million tons versus 210 million tons in the previous bill) with about 10 percent lower present value of utility costs over that period (63 billion versus 70 billion)." Although it would seem that changes made to the bill by Senator Mitchell result in 10 percent less cost, further analysis reveals that this cost reduction is offset by increased costs caused by provisions that were added in the last committee mark up by Senator Graham and Senator Stafford.

Senator Graham offered an amendment, that Senator Stafford helped develop, requiring that all plants that reach 40 years of age meet the New Source Performance Standards. This is not only a continuation of the unfair percentage reduction requirement, but it also increases the costs of the bill to the point where new cost offset the cost reductions produced by Senator Mitchell's previous revisions to the bill. The EPA/ICF report notes that "in 2000, utility annual costs would still be very high, $8 billion versus $9 billion under the previous bill and in later years would be expected to be even higher because of the 40 year NSPS requirement."

In addition, the report notes "the 40 year/NSPS would increase costs to the industrial boiler sector substantially after 2003 by about $1 to $2 billion annually. This increase would effectively offset the 10 percent cost reduction in the utility sector. Thus, the total cost of the revised bill would not be significantly different than the previous bill." It is unfortunate that this last minute amendment eroded the beneficial changes that were made to the Committee bill. The total EPA/ICF review of estimated utility SO2 emissions and cost consequences of the recently revised Mitchell bill will be included at the end of my remarks.

NEEDED CHANGES IN THE BILL

As I noted at the outset of this statement, I believe the mark up process in committee has improved the acid rain portions of this bill in some respects. Senator Mitchell and I are close to developing the kind of legislation that can enjoy broad support in the Congress, but we need to continue negotiations among key Senators in order to produce a final package for floor consideration. I see the need for four key changes in the Committee acid rain bill:

1. Reduce the overall sulfur dioxide emission reduction requirement,
2. Exempt new plants meeting the New Source Performance Standards (NSPS) from onerous requirements in the bill,
3. Delete the special plant-specific requirements of Section 183(b), and

4. Exempt clean western and central states from the sulfur dioxide emission reduction requirements in the bill.

Making the above changes in the Committee passed bill would certainly increase the chances that the bill could get widespread support on the Senate floor.

OTHER CONCERNS ABOUT ACID RAIN LANGUAGE

I would also like to call attention to a particular set of amendments that were added late in Committee mark up which I am concerned may overlap and affect adversely the issues that we had been so carefully and constructively considering. Taken together, these amendments (to sections 110(a)(2)(E), 126, 302(h), and 304(a)(i)) could serve to establish an ad hoc standard setting and implementation program that is at best redundant with other provisions. At worst they could create a resource intensive exercise that would substantially interfere with efforts to develop and implement Clean Air Act goals. The amendments would greatly broaden sections 110 and 126 to deal with interstate and international air pollution that may "interfere with" attaining NAAQS or cause or contribute to "adverse effects" on public health and welfare, whether or not it is in violation of a NAAQS. The amendments would also allow states or citizens to force findings by the EPA administrator on whether particular sources or groups of sources caused such adverse effects. The new provision would provide numerous opportunities for contention and for down-wind states to claim adverse effects or alleged transport in lieu of developing adequate controls of their own, but do not provide mechanisms for dispute resolution. These provisions do not state specific goals, give guidance, or provide appropriate thresholds. In fact, these provisions may be a thinly veiled effort to institute federal common law. Thus, they would raise new problems without opportunity for clear technical or administrative solutions. I oppose these provisions stringently!

It is my understanding that the original interstate transport sections were carefully constructed in the existing act to apply to a very limited set of circumstances. I am concerned that the proposed amendments, by modifying the language of these sections, could have profound effects on current clean air act programs and on the programs put forth in the committee bill. A review suggests that these provisions would be at cross purposes with the Committee intent in establishing carefully determined ozone transport regions and with allocation schemes contemplated in Title II acid deposition provisions. Other unforeseen consequences may also ensue. It appears likely that the existence of these sections would create substantial uncertainty and duplication in making progress toward clean air act goals, and may therefore result in unnecessary delays.

Section 110(a)(2)(E) would prohibit any stationary source or sources from emitting pollutants in amounts which will interfere with attainment or maintenance of NAAQS in another state. Both the present law and the provisions for ozone transport regions in the Committee bill restrict determinations to situations that "prevent" attainment. Substitution of the notion of interference introduces troublesome ambiguities. Since any measurable amount of pollution contributes to ambient background concentrations, it follows in the absence of any clear legislative guidance, that transportive pollutants in any amount across state lines is barred by the amendment. This is clearly unworkable, and attempts by EPA to define an appropriate threshold of interference would confront the same technical and political obstacles that are faced under the existing statutory language. Thus, the simple fact that the emissions from a source in one state migrate across a state or international boundary -- despite the fact that the contribution of the emissions by that source to ambient concentrations may be minor -- would be sufficient to trigger numerous unqualified and disruptive citizen suits under Section 304(a)(1) or petitions by the "affected" state under Section 126 for "remedial" action by EPA in lieu of fulfillment of that state's own obligation to correct air quality problems generated substantially by sources within its own boundaries. In addition, the amendments also add requirements concerning the analysis of impacts on foreign countries. The relationship of these requirements to Section 115 of the existing law has not been examined.

Section 126 amendments which define as a violation of that section the emission of pollutants or precursors that adversely affect public health or welfare are at best superfluous in view of well-tested provisions for the establishment, review, and revision of National Ambient Air Quality Standards (NAAQS). At worst, the amendments would set up an unnecessary alternative ad hoc standard setting process that lacks any definitive guidance on scientific and technical basis for decision making. Other amendments to Section 126 are even more ambiguous in that they require notice to be given to states by major new or modified stationary sources in adjacent states if they will simply contribute to levels of air pollution, regardless of any relationship to ambient standards, health or welfare. This is absurd!

The changes suggested in the language of Section 302(h) are clearly unnecessary. The definition of public welfare in the current Act is broad enough to encompass any suspected effect of acid precipitation, and explicitly incorporates effects on weather and climate. Defining an effect on precipitation as an effect on public welfare -- whether or not the changed precipitation leads to any subsequent environmental effects -- is unwarranted and likely to lead to debate in litigation over issues unrelated to real-world welfare concerns. The addition of the clause concerning transformation, conversion, or combination of pollutants is misplaced and also unnecessary. Section 302(g) already defines the term "air pollutant" to include an "agent or combination of such agents...which is admitted into or otherwise enters the ambient air." This definition has long been found to encompass transformation and conversion products (ozone is a prime example of a regulated pollutant formed in the atmosphere).

These amendments appear unnecessary and could interfere with a sound administration of both new and existing air pollution control programs. I view the addition of these amendments as another attempt on the part of the committee staff to provide for federal common law in an indirect approach. The amendments appear to be an attempt to address the same basic kinds of concerns which are already fully addressed by the proposed Title II of the committee bill, but they go much farther. As such, the amendments are at best redundant, and at worst they would be administratively burdensome, lack technical defensibility, and would substitute ambiguous legislative language for a clear legislative mandate on the long-range transportive air pollutants. In essence, these amendments add insult to injury.

OTHER PROVISIONS IN THE BILL

The committee reported bill contains many other onerous provisions that range from intrusions upon the Interior

Department jurisdiction over OCS operations to overzealous attempts to address the hazardous air pollutant issue. The committee bill has been "loaded up" with provisions that the most radical environmental groups hold close to their bosoms. However, all of these provisions are counter productive because they only alienate Senators from all parts of the country and add to the polarization that already exists. It is unfortunate that the committee staff does not have an adequate desire to formulate simple, reasonable, concise, legislative language that will address only the most important clean air issues without addressing peripheral agendas. It is the American people that suffer in the end because the hidden agendas only make it easier for the opponents of clean air legislation to ensure that what the committee reports out will not see the light of day on the Senate floor.

The ozone non-attainment provisions and the hazardous air pollutant provisions are fatally flawed and this will be demonstrated when reasonable and thoughtful Senators are forced to place "holds" on the committee bill in order to address the concerns of their constituents.

For this reason I am giving serious consideration to the formulation of a substitute bill which could be offered on the Senate floor in place of the overloaded committee bill. I look forward to the day that Congress can reauthorize the Clean Air Act and I trust at that time reason will prevail.

APPENDIX A

DETAILED ANALYSIS OF COMMITTEE BILL PROVISIONS

This Appendix provides a detailed analysis of various key elements of the adopted provisions of the Committee bill.

RELATIONSHIP BETWEEN TITLE I AND TITLE IV

Title IV of this bill requires the EPA Administrator to promulgate new primary national ambient air quality standards for, among others, (1) an additional ozone standard that is "more protective" of public health than the current primary national ambient air quality standard which was promulgated to protect public health including an adequate margin of safety, (2) an additional primary national ambient air quality standard for nitrogen oxides, and (3) an additional primary national ambient air quality standard for carbon monoxide. The schedule for these new standards is:

POLLUTANT	TIMING
Ozone	Three years after enactment
Nitrogen Oxides	Four years after enactment
Carbon Monoxide	Two years after enactment

Title I of this bill requires States to determine whether they can meet the attainment date of December 31, 1992 no later than the time for plan submission of December 31, 1989. Consequently, Title I applies only to the existing primary national ambient air quality standard for ozone and carbon monoxide since the new standards would not be promulgated prior to action under Title I.

Therefore, plans to attain the new standards would be subject to the provisions of Section 110 of the Clean Air Act. Section 110 sets forth procedures for action to attain new standards. First, States have nine months to submit plans. Second, EPA must approve or disapprove plans in four months. Third, the plan must provide for attainment of the standard in three years or, under certain circumstances, five years. Thus, under Title IV, a State would have from seven to nine years from date of enactment to meet the new ozone standard and from six to eight years to meet the new carbon monoxide standard.

Even a casual observer would conclude that an area that cannot meet the current ozone standard is not going to meet a new "more protective" ozone standard and a high altitude area that cannot meet the current carbon monoxide standard is not going to meet a new high altitude carbon monoxide standard. Yet, under this bill an area which is in the ten year or fifteen year ozone nonattainment category would have to commit to all the burdensome and onerous provisions of Title I in order to avoid immediate sanctions only to discover three years later that it must meet a new standard in four more years--three years before the requirements of Title I.

These inconsistencies throw even more chaos and uncertainty into the deliberations that cities, counties, and states will be making to salvage some level of economic stability after the effects of this bill.

DEFINITIONS IN TITLE I

Before evaluating the specific requirements of Title I, it is useful to understand the definitional changes to Part D.

Lowest Achievable Emission Rate

Presumably the changes in this definition are proposed to attempt to enhance the extent of permit technology review and the rigor of new source permits. In reality the problem is that Lowest Achievable Emission Rate (LAER) is a flawed concept that cannot be modified to work in this application.

If Congress seeks effective new source technology reviews, it would be far more valuable to utilize the same Best Available Control Technology (BACT) definition from the Prevention of Significant Deterioration provisions of the Clean Air Act (Section 169(3)) and spend some effort to assure that BACT determinations are effectively distributed to state permitting agencies. In general, state permitting agencies do not have the resources to investigate allegations of more effective technologies rumored to be used in some far corner of the world as a part of the normal permit review. Similarly, permit applicants do not have the authority to obtain detailed technology information from other companies and, in many instances, are also resource limited--particularly in view of the new major stationary source definition.

Consequently, this bill's modification of the LAER definition will be useful to those whose objective it is to use environmental law to delay, postpone, and deter economic progress, but it will do little to effectively improve permit technology reviews.

Major Stationary Source

This provision changes the definition of major new sources from 100 tons/year to 25 tons/year and the definition of major modification from a net increase of 100 tons/year of carbon monoxide or a net increase of 40 tons/year of hydrocarbons and nitrogen oxides to 10 tons/year.

At the same time it adopts the so-called dual definition of a source. This dual definition provides that either a single source (e.g., tank, pump, vent) or an accumulation of sources (e.g., tank farm, pumping station, refinery) which exceed the 25 or 10 tons/year limit would be subject to the requirements of Part D of the Clean Air Act. If the purpose of such a definitional change was to assure that these smaller sources would be subject to a BACT review so that virtually all sources would have to meet a technology test, there would be some merit in such an application. Unfortunately, the implications are much broader.

1. It broadens the requirement for offsets to these smaller sources at a time when the other provisions of the bill are virtually eliminating any available offsets; for areas seeking 10 year and 15 year extensions, the offset requirement is twice the new emissions.

2. For existing sources, it incorporates these smaller sources into the mandatory annual individual source reduction requirements.

3. It subjects these smaller sources to $5000/ton and larger fines when they fail to meet these mandatory reduction requirements.

4. It expands to these smaller sources the existing theory of holding new, environmentally sound economic growth hostage to compliance of existing sources regardless of whether noncompliance is restricted to technical violations, to constitutionally protected issues of due process, or, if such a theory has any merit, to situations which represent a history of bad faith on the part of the permit applicant at its existing sources.

Reasonably Available Control Technology (RACT)

1. Definition--This definition is confusing at best. The term suggests that some balance is to be drawn in its use of the word "reasonable". Yet, this balance is absent in the definition. The definition is essentially "...the maximum degree of reduction of emissions...that the permitting authority determines is achievable for the existing source or class of sources...." The definition continues to list items that must be considered--"potential toxic character", "degree to which...area needs further reductions", and "achievability ... shall not be determined solely on the basis of the marginal cost per ton of pollutant removed". Contrast this definition to the BACT definition for new sources under Section 169(3) which requires the emission limitation to be "...based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility, which the permitting authority, on a

case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility...." A literal reading of this RACT definition would suggest that the only factors to take into account are the ones listed.

Clever lawyers could argue that since Congress specifically listed factors it wanted to be considered in the BACT definition and did not include the same factors here, Congress did not intend for energy and economic impacts and other costs to be included in the RACT determination. Existing sources could be compelled to meet more rigorous requirements than new sources--violating engineering and economic realities. This approach hardly seems to be a useful avenue for pollution control policy. It is particularly distressing because under the current RACT process there are several RACT requirements that are essentially equivalent to LAER requirements; these include some of the major source contributors such as volatile organic compound storage tanks and refinery/petrochemical fugitive losses.

2. Public Review--A second question arises regarding the nature of RACT determinations. The bill is abstruse regarding whether these RACT determinations will be subject to normal public review. There is no indication that these determinations will have to be justified, subject to public comment, and reviewable for fairness and accuracy.

Vehicle Emission Inspection and Maintenance Program

This definition is particularly troubling because of its apparent unreviewable discard of current Inspection/Maintenance (I/M) programs, its expansion of programs beyond the nonattainment problems of the area, and the potential excessive cost to individuals.

1. A literal interpretation of the definition would conclude that any nonattainment area covered by this bill (with a population of 100,000 or more) would be required to have a program for hydrocarbons, nitrogen oxides, carbon monoxide, and diesel particulates. Thus, even though an area may be in attainment for carbon monoxide and nonattainment for ozone, it would be required to have an I/M program for carbon monoxide. Current I/M programs are required only for the nonattainment pollutants. There seems to be little public policy reason to subject vehicle owners to the costs of I/M for pollutants that are not a problem.

2. Because the definition is written such that all the listed requirements apply to all the listed pollutants, these enhanced I/M programs would require annual emission testing for nitrogen oxides. Many experts indicate that

the only meaningful nitrogen oxides emissions test requires a dynamometer. Costs associated with valid dynamometer tests can exceed several hundred dollars per test. There appears to be no justification for such a requirement based on a clear expectation that ozone would be reduced.

3. Under current I/M programs tested vehicles largely comprise the predominant segment of the vehicle fleet. Many current programs test the latest eight model years. This definition would require all vehicles regularly operating in the program area to be tested. Many older vehicles are owned by those on the most limited incomes. It is unclear that there is any benefit to requiring poor families owning 1970's vehicles to pay several hundred dollars for an I/M test followed by a repair cost of several hundred dollars when the percentage of these vehicles is so small in the total vehicle fleet.

4. This definition mandates annual emission testing, presumably tail-pipe testing. There are experts who believe that new vehicle engine diagnostic tools are becoming so sophisticated that progressive I/M programs will be largely devised around these new tools. This will make current tailpipe emission testing obsolete. Yet, under this definition, tailpipe emission testing would have to continue.

5. Many current I/M programs utilize the service station dealer network to provide convenient testing availability. This definition would effectively preclude any extensive decentralized test program and substantially increase mandated costs for state and local governments by forcing the installation of expensive equipment that is potentially obsolete. Purposely discarding current programs without clear justification that they are not capable of meeting the environmental objectives of the Act is unwarranted.

Technological Requirements by Federal Government

There are two sections in the bill which require EPA to develop regulatory efforts for various types of source categories. In Title I, Section 102(d) requires EPA to publish control technique guidelines to establish RACT (as defined under this bill) for eleven categories of sources within two years of enactment and to revise all existing RACT control technique guidelines consistent with the new RACT definition within four years of enactment. If EPA fails to meet the legislated deadline each source must meet a 90 percent reduction from uncontrolled emissions. In Title III of the bill, Section 304 requires the EPA to promulgate regulations for six other categories of sources within two years of enactment. These regulations must address new sources and existing sources.

Existing source standards must be at least equivalent to RACT (as defined by this bill).

Since both actions must be taken in the same time frame with regard to the 17 listed source categories, there is no apparent reason for these mandates to be defined in two different titles of the bill.

More importantly, there appears to be some distinction between the act of publishing guidelines and promulgating regulations. If the use of the term publishing is intended to circumvent the opportunity for public review and participation in the implementation of a RACT definition that can exclude all energy and economic factors and other costs, it would be improper and inequitable.

One of the great failings of the existing use of control technique guidelines is the prevention of a fair opportunity to address inadequacies in the development of these guidelines. Future actions, particularly in view of a legislative RACT definitions, can only be fairly conducted if these essentially regulatory efforts are exposed to the normal regulatory development process.

PROVISIONS OF TITLE I--GENERAL COMMENTS

A general review of the provisions of Title I reveals two troubling concepts. On one hand, it appears to perpetuate the presumptions of the current hydrocarbon based control strategy. The Texas Ozone Task Force must question the wisdom of assuming that a control strategy which has done so little for so many should be the basis for so much future national economic pain. On the other hand, Title I adds to the current hydrocarbon control strategy, an essentially equal nitrogen oxides control strategy. While it is true that ozone is formed by a reaction between hydrocarbons and nitrogen oxides, there is also considerable scientific evidence that the relative relationship between the two can influence the ultimate levels of ozone. Certain ratios of hydrocarbons and nitrogen oxides reduce the ozone formed; other ratios increase the ozone formed. Ozone formation science is not precise, but it does not suggest that the appropriate control strategy is an equal rollback of hydrocarbon and nitrogen oxide emissions from whatever level they may be at today.

The Texas Ozone Task Force believes that some truly objective scientific review of the ozone control strategy must be conducted during the next five years to evaluate what measures should be undertaken in these enduring nonattainment areas. While it is clear that there are some truly reasonably available control measures that can be taken in the short term, these are not likely to achieve the reductions mandated in Title I and it is not nationally beneficial to embark on the course required by this bill without some sense that it will be effective.

ATTAINMENT DATES

The bill currently includes four attainment dates:

1990 - For areas not part of an ozone transport region with an ozone concentration not in excess of 0.14 parts per million.

1992 - For areas with an ozone concentration not in excess of 0.18 parts per million or for other areas in excess of 0.18 parts per million which can demonstrate attainment.

1997 - For areas with an ozone concentration in excess of 0.18 parts per million but less than 0.27 parts per million.

2002 - For areas with an ozone concentration in excess of 0.27 parts per million.

An area with an ozone concentration less than 0.18 parts per million can obtain a 1997 attainment date, but only the specified area--which is presumed to be the Los Angeles environs--can obtain a 2002 attainment date. Once an attainment date is selected, failure to attain results in sanctions, unless waives or delays the sanctions based on a "flexibility" provision adopted during Committee consideration of the bill.

The additional provision that was adopted which makes the options for an area even more confusing. Under this provision, an area would identify, in addition to all of the other controls it must implement prior to its designated attainment date, a series of additional controls, including a further revision to the major stationary source definition reducing the threshold from 25 tons/year to 10 tons/year. If the EPA Administrator determines that an area has made a good faith effort to attain the standard, the Administrator may extend the attainment date to a date no more than 3 years beyond the missed deadline or the next attainment date whichever is earlier. Presumably, this means that a 1990 area could extend to 1992, a 1992 area to 1995, and a 1997 area to 2000.

Thus, under this provision an area, which tries to meet the 1992 attainment date but fails, would have to implement all the requirements of an area with a 1997 date plus apply LAER control to new sources of 10 tons/year or more in order get an extension to 1995. If it fails to meet the standard in 1995, no further extension is available. There is no public policy purpose served by such a convoluted process.

The factors that the Administrator must assess in granting an extension are: (1) whether the plan has achieved at least 90 percent of its expected emissions reductions (other than those related to Federally implemented controls, (2) whether an area has used its options regarding transport of pollution, (3) whether air quality has improved, and (4) whether the causes of failure were foreseeable and could have been taken into account. Previously recorded weather variations are deemed foreseeable.

There is no clear sense of how the Administrator is supposed to use these factors in his decision. The entire history of ozone nonattainment suggests that the control strategy has failed to produce environmental benefits. An area could achieve its expected emissions reductions with no change in air quality. Current regulations on air quality measurement allow for certain exceptions for weather variations. Is this intended to preclude these exceptions? If an area knows that it periodically is confronted with weather related violations of the ambient standard such that it would not be in attainment if these were counted, is this language designed to require the area to eliminate all anthropogenic emissions?

Separate requirements are listed for 2002 attainment date areas. The date does not apply if the State submits a plan which contains provisions, to be implemented by year end 1997, including provisions that requires passenger vehicle occupancy to exceed 1.5 persons per vehicle, converting not less than 40 percent of the total registered vehicles to low emission vehicles, and controlling all commercial and residential sources which emit one ton/year or more to the maximum extent practicable. Given the fact that most experts would question whether the Los Angeles area can realistically hope to meet the ambient standard by 2002, it would appear that the Committee has decided to say either Los Angeles will be sanctioned or it will adopt this series of social regulations. Exactly why the Committee believes that vehicle passenger occupancy is a feasible control technique is unclear. Exactly how the Committee believes that an area can control which vehicles will be purchased or moved into an area is equally unclear. Even though California can set its own motor vehicle standards, the is a serious question regarding whether all vehicles in California must meet the Committee's judgement of what Los Angeles needs. This type of social engineering is a serious breach of the responsibilities of Congress. Issues like vehicle occupancy and use of special vehicles should be resolved with consideration to broader issues that pressure to attain an ambient air quality standard.

Houston is automatically included in the 1997 category. However, most observers and analysts familiar with the Houston ozone situation do not perceive that a 1997 attainment date is feasible. Consequently, once again Congress is moving forward on legislation which discounts the experience of the last 15 years in favor of a theory that legislative deadlines for ambient air standard attainment will produce atmospheric results.

Dallas-Ft. Worth falls in the 1992 category; however, because the Dallas-Ft. Worth emissions inventory is so enormously dominated by mobile sources, most experts would not believe 1992 is a realistic attainment date. Consequently, it will likely be required to seek a 1997 date under this legislation. There have been no extensive studies which suggest whether 1997 is realistic.

At issue here is credibility. The people of Houston, the people of Dallas have been led to believe by enactment of the Clean Air Act and the Clean Air Act Amendments of 1977 that if they took the steps contemplated in these laws, their air would meet the national ambient air quality standard. It hasn't happened. Their local leaders have enacted the regulations and imposed the new programs, but they are now convinced that they cannot effectively predict or promise if the air in these areas will meet the national ambient air quality standard. If Congress continues to enact laws which most experts know cannot achieve the promised results, the pollution control process will lose credibility. Their is no public policy value to destruction of public faith in the Clean Air Act. Public support and cooperation are needed to implement whatever controls are developed. Houstonians, Texans, all citizens want clean air, but they want strategies which will work effectively toward achieving that goal.

This argument is not intended to suggest that some form of deadlines for action are not needed to pressure the process. In fact, prior to adoption of the Stafford amendment on additional attainment dates, the Subcommittee print already included a wide array of requirements with specific time deadlines and with sanctions for failure to act. Each of these specific requirements is also retained in the bill as adopted by the Committee. While the specific elements of these requirements are not achievable in an area like Houston and would result in serious economic and adverse social consequences, the general model of using action steps as a gauge of progress has considerable merit. A similar concept was recommended by the National Commission on Air Quality for nonattainment areas.

THRESHOLD FOR OBTAINING ATTAINMENT DATE EXTENSION

Section 101 of the Committee bill requires as a threshold for extension of the current attainment date a condition that failure to attain by the current date was "...despite good faith efforts to comply with this part and to implement all measures in approved or submitted implementation plans...." State implementation of all measures in approved or submitted implementation plans should constitute good faith efforts. No other test should be required.

SPECIFIC REQUIREMENTS

For an ozone nonattainment area to extend its compliance date to 1997, it must adopt the following specific requirements:

1. The operation of a vehicle inspection and maintenance program as defined in this bill.
2. The operation of Stage II vapor recovery.
3. The requirement of alternative fuels for centrally fueled vehicle fleets of 50 or more vehicles.
4. Application of RACT (as defined in this bill) to existing sources of hydrocarbon and nitrogen oxide emissions.
5. No emission reductions required under Section 110 or Part D of the Clean Air Act can be achieved through reductions at other sources.
6. All new or modified major stationary sources (as defined in this bill) must comply with LAER (as defined in this bill).
7. The adoption of RACT (as defined in this bill) for categories identified by a regional commission.
8. Area wide hydrocarbon and nitrogen oxides must be reduced from 1987 emissions levels by 33 percent by year end 1991, 50 percent by year end 1994, and 65 percent by year end 1997. A lower target may be used if justified, but it cannot be less than 5 percent per year--50 percent below 1987 levels by year end 1997.
9. Specific strategies and transportation control measures to offset any growth in vehicle miles traveled, to offset any increases in emissions associated with growth in vehicle miles traveled, and to attain reductions in mobile source emissions necessary to meet aggregate emissions reductions targets. These measures must include or substitute for the reductions that would be achieved by the following measures:

    A. Programs to limit or restrict vehicle use in downtown areas through road user charges, tolls, parking surcharges, vehicle restricted zones, vehicle restricted periods, registration conditions, or other devices.

B. Limitation of certain roads or lanes to common carriers or to high occupancy vehicles.

C. Programs for improved public transit.

D. Requirements for major employer participation in programs to encourage use of public transit and multiple occupancy vehicles, and in programs providing alternative work hours.

E. Conversion of fleet vehicles to cleaner engines or fuels, or to otherwise control fleet vehicle operations.

F. Traffic flow improvements.

G. Trip reduction ordinances.

H. Programs for area wide ridesharing.

10. Each major stationary source (as defined in this bill) of hydrocarbons and nitrogen oxides must reduce its emissions rate so that it achieves a percentage reduction equivalent to the area wide percentage reduction by the end of 1991, 1994, and 1997 . Credit is allowed for reductions made during and after 1982 based on RACT and LAER (as defined in this bill).

11. The adoption of an emission fee of at least $100/ton.

12. The adoption of an excess emissions fee that is collected whenever a major stationary source fails to meet its annual reduction target equal to the value that failure to meet the reduction benefits the source but it must be no less than $5000/ton.

13. A binding commitment to implement coordinated planning requirements.

14. A requirement that new or modified sources must obtain offsets at least twice the amount of the allowable emissions they are seeking to permit.

Failure of a State or local government to meet each and every one of these provisions would result in sanctions. Yet, virtually all of these provisions present significant difficulties, perhaps insurmountable difficulties, in their application.

Following is an assessment of each critical element.

Inspection/Maintenance

Concerns about the implementation of this requirement are largely described in the earlier discussion on **DEFINITIONS IN TITLE I**. The Texas Ozone Task Force recognizes and endorses the concept of improving current inspection/maintenance programs that are required under the Clean Air Act; however, this legislatively prescribed program would exceed the needs of the nonattainment areas and its costs would be well beyond acceptable levels to many segments of the population. These excessive costs and legislative limitations would delay development of more effective inspection/maintenance procedures based on new technology.

Stage II Vapor Recovery

In any consideration of Stage II Vapor Recovery it is first imperative to recognize that it is not a panacea that will produce attainment. It represents an intense demand on the enforcement capabilities of State and local government agencies which will not be offset by the funds provided by the Federal government.

Moreover, elsewhere in this bill, the Committee has required the implementation of onboard vapor recovery canisters for vehicles. EPA has recently proposed rulemaking that would also require the onboard canister, thus making the legislation unnecessary. Emissions that would be recovered by Stage II Vapor Recovery will be collected by onboard canisters. At the same time, onboard canisters can also recover so-called hot soak and diurnal breathing losses and can be designed to address the issue of running losses that has been identified by the HRM studies. These emissions cannot be collected by Stage II Vapor Recovery and specifying this technology becomes redundant.

Alternative Fuels for Fleets

The concept of alternative fuels for vehicle fleets in nonattainment areas has drawn considerable attention and deserves to be examined. However, it is not a clear cut decision. There are significant questions about the environmental effect of alternative fuels. Some fuels, which are perceived to be more environmentally beneficial, may simply delay the effects of current fuels or may create other environmental problems. Even for centrally fueled vehicle fleets, refueling may be an issue in areas where such fleets now cover large areas. Issues of availability, cost, and feasibility need to be examined.

For example, methanol fuels which appear to be a popular alternative choice in the Los Angeles area require about twice the volume to produce the same energy as gasoline. Therefore, it will require twice the storage capacity. Construction of new storage in Los Angeles will require two for one offsets under this bill.

There are major questions regarding whether the new storage could be constructed under the provisions of this bill.

While the concept of alternative fuel use has merit, the realities of its implementation make the absolute requirement of the provision undesirable.

Application of RACT

The concept of requiring RACT on existing sources is entirely appropriate. At issue is the meaning of RACT. Current RACT embraces critical cost effectiveness tests. RACT, as redefined in this bill, discards those cost effectiveness tests and replaces it with a definition that excludes many important factors in determining reasonable controls for existing sources such as energy and economic factors and other costs.

Prohibition of Bubbles

There is no apparent reason why a cost effective mix of controls that produce the same level of emissions reductions at a source by controlling some more intensely than others should be prohibited. The effect of such a prohibition is even more significant when viewed in the context of the requirements for individual stationary source reductions and the excess emissions fee provisions.

Application of LAER

The concept of requiring new or modified sources to be subject to a rigorous technology review as a part of the permitting process is entirely appropriate. At issue is the use of the LAER process as defined in this bill. As stated earlier, LAER is a fatally flawed concept. It would expend enormous time and resources in searches for technologies which would produce little in the way of results. A far better effort could be made in utilizing the successful BACT approach with more effective efforts to assure that BACT information is readily available to all state permitting authorities.

Area Wide Emissions Reductions Targets

This concept, when originally presented to the Subcommittee, was the primary mechanism to define progress toward attainment in areas faced with enduring nonattainment problems. This concept is meritorious. It moves the stewardship role of the Federal government from a review of the intangible concept of attainment of an ambient air quality standard at a distant time to a review of the tangible actions by a State regulatory authority. Failure to meet these tangible targets would subject an area to sanctions. Now, the Committee has added specific sanctionable attainment dates to the process, but it retains the these sanctionable provisions as well. The issue is whether the rollback targets in the bill are achievable.

The targets apply to both hydrocarbon and nitrogen oxide emissions. The reduction targets are based on the total emissions in an area in 1987 and range from a minimum of 5 percent per year (20 percent by 1991, 35 percent by 1994, and 50 percent by 1997) to a maximum of 33 percent by 1991, 50 percent by 1994, and 65 percent by 1997.

In Houston, neither the minimum nor the maximum targets are achievable without potentially massive economic distortion and an overwhelming restructuring of the social fabric and life style of the area. In no sense can these targets be considered as a moderate or reasonable expectation to do what can be done. Houston has reduced its hydrocarbon emission base by more than 40 percent from 1980 to 1987, and by substantially more than that from the early 1970s. These were difficult, costly steps. There are few remaining steps to take short of limiting the area economy in draconian ways. Nitrogen oxide limitations are also in effect and technological options here are less flexible.

These targets are apparently based on the erroneous assumption that there are some hidden technological options that have not been explored. This assumption is also reflected in the specific requirements related to transportation control measures and stationary source control measures.

Perhaps more importantly, the adoption of the Stafford deadline amendment will override the application of the targets in this section and in both the transportation control measures and stationary source control measures as well. Presumably, if an area cannot show attainment by 1997 with a 65 percent reduction in emissions, it must do more.

Inevitably, State agencies are faced with one of several losing choices. The first is whether to "game" the attainment demonstration to find the least onerous set of requirements that can "show" attainment. If unsuccessful in attaining the standard or meeting any of the interim requirements, sanctions would be imposed. The second is whether to take the position that "gaming" is incorrect, but the requirements of this bill cannot be met.

At this point neither choice is palatable; neither option is particularly different than those confronting States under current law; but, the consequences of inevitable failure under this bill are worse than the consequences of failure under current law.

Transportation Control Measures

1. Context Within Mobile Source Reductions--Before describing specific concerns about transportation control measures, it is necessary to place them in the context of mobile source reductions under this bill. Hydrocarbon and nitrogen oxide emissions are divided into two broad components--stationary sources and mobile sources. This bill requires area wide percentage reductions and stationary source reductions in identical percentages; consequently, mobile sources would have to be reduced by the same percentage. Thus, mobile sources would have to be reduced by a minimum 5 percent per year.

   Mobile source reductions are comprised of three basic elements------reductions from federal mobile source standards because of vehicle fleet turnover, reductions from the inspection and maintenance program, and reductions from transportation control measures. At issue is whether this mix of options can reduce mobile source emissions over the time frame required in this bill at the levels required in this bill. As an example, it would be useful to determine whether mobile source emissions can be reduced by 20 to 33 percent by the end of 1991.

   Federal mobile source standards will produce additional reductions in mobile source emission during this period through vehicle fleet turnover and there will be important participation in these reductions from the current inspection and maintenance programs. Some information on the magnitude of these reductions may be obtained from looking at information developed with regard to the Dallas area. Current estimates would suggest that between 1987 and 1992 the combination of federal standards and I/M will reduce mobile source hydrocarbon emissions by a total of about 17 percent over 5 years or roughly 3.3 percent per year. By year end 1991, total reductions would be 13.4 percent. This amount would be roughly 6 to 20 percent short of the required reduction target. The question then becomes whether the enhanced I/M requirementsand transportation control measures can provide this difference.

   It is unclear that the enhanced I/M program required in this bill will dramatically improve the effectiveness of I/M programs for hydrocarbons. It is unclear whether existing I/M programs can continue to be as effective as they have been for hydrocarbons. The key to effective I/M programs is engine emission deterioration. If new vehicle emissions deteriorate less than older vehicle emissions, existing programs will be less effective. Current I/M programs are designed to achieve at least a twenty five percent reduction in emissions. For I/M programs to add to mandated reduction targets, it would have to be more effective. Yet, several studies undertaken by the National Commission on Air Quality have suggested that this twenty five percent target is on the high end of expectations for I/M programs. Other studies suggest that new vehicles will not deteriorate as extensively as older vehicles and I/M programs will be less effective.

2. Effectiveness--Another issue is whether the transportation control measures required by this bill will be effective. The concepts of transportation control measures are not new. They have been evaluated before and in some instances can be effective. They, however, must be considered in the context of the areas in which they must operate.

   In cities, like Houston, where population density is relatively low, vehicle miles traveled are more extensive than in older more densely populated cities. In those cities, which grew most extensively when gasoline was inexpensive, mass transit has not been developed as well as in cities which developed in a different time. Low population density still constrains it use. Houston has spent millions of dollars developing its mass transit system, but the task still remains enormous.

   This bill mandates requirements that are oriented toward reducing vehicle miles traveled. The problem with this approach is that reducing vehicle miles traveled is not the only way to reduce transportation related emissions. A more appropriate approach would be to address emissions reductions.

   In this context the Houston area evaluated an extensive list of transportation related controls as a part of the current Implementation Plan development. These included: vanpool encouragement, enhanced park and ride facilities, and improved bus services (including High Occupancy Vehicle lane improvements). Several other options were evaluated but were largely considered infeasible or duplicated by these measures.

   The total reductions projected from 1980 to 1987 for these transportation control measures amounted to 2.4 percent of total mobile source emissions--or approximately 0.35 percent per year. These measures are in the process of being put in place. Transportation control measures in cities like Houston are not a major realistic option for reasonable controls. Even if these existing measures had not already been adopted, they would have a minimal impact on meeting the 20 to 33 percent target by 1991.

3. Federal Land Use Implications--If it is the intent of this provision to require massive life style alterations, the Texas Ozone Task Force opposes this type of Federal intrusion into local planning decisions and believes that such decisions must be made on the basis of all relevant factors not just ozone nonattainment considerations. Programs to "limit or restrict

vehicle use in downtown areas" could work against public efforts to create the high density nodes that are essential to mass transit. If the term "trip reduction ordinances" is intended to include prohibitions on vehicle use or gas rationing, the people of Houston have indicated intense overwhelming opposition to such measures when they have been previously suggested.

The indignation over such measures will undermine support for reasonable measures to improve transit and traffic flow. Public policy on environmental issues will suffer and support for any legislation will dissolve.

Stationary Source Control Measures

This requirement appears to be predicated on the assumption that stationary sources of hydrocarbons and nitrogen oxides can have such precise control of their emissions that they have the capability to iteratively ratchet down emissions. This is not the case. Technology to reduce emissions has been diligently developed over the past two decades, but there are physical limitations affecting both existing and new sources. The effect of this requirement can be devastating to critical national industries including petroleum refineries, chemical plants, utilities, and gasoline distribution operations.

Changes in the definitions of RACT, LAER, and major stationary source will exacerbate the problems. Prohibitions of bubbles can also be significant. Credits for reductions made during or after 1982 may or may not be significant, but they will discriminate against those who acted expeditiously to reduce emissions.

Some examples of the implications of this requirement will explain the scope of these problems. Many of the emissions sources in the Houston area for hydrocarbons are storage tanks. The Texas Air Control Board (TACB) has regulated emissions from storage tanks since the mid-1970s. Most tanks have used floating roofs as a control measure. These were largely required by 1975 and generally reduce emissions from an uncontrolled level by about 95 percent. In 1979, the TACB required the installation of secondary seals on these tanks which increased control effectiveness to approximately 99 percent. Compliance was required by year end 1982. All tanks with a capacity greater than 42,000 gallons(1000 barrels) are regulated. Similarly, all new tanks constructed after May 1977 were required to have secondary seals under the new source review requirements of the Texas Air Control Board. Federal New Source Performance Standards effective in May 1978 required secondary seals for new tanks.

Under this section, any existing tank which met the TACB regulation prior to 1982 or any new tank with secondary seals constructed prior to 1982 would be subject to a minimum emission reduction requirement of 5 percent per year, despite the fact that emissions have already been reduced by 99 percent. There is no additional retrofit technology for tanks; tank emissions are not throughput related. The minimum 5 percent per year requirement cannot be met for tanks with this technology in place before 1982.

For tanks implementing secondary seal technology during or after 1982, the issue is whether credit is available. The answer hinges on two factors--(1) the new definitions of RACT and LAER and (2) the implications of the statutory deadlines for attainment.

For example, the new LAER definition requires that only the most rigorous ten percent of technologies meet the LAER definition. If there is some slightly more effective new tank technology--such as internal floating roof tanks with secondary seals--even if these technologies may be used in only limited cases, any new tank with an external floating roof with secondary seals could be viewed as failing the LAER test. Such a judgment would eliminate these tanks from the credit mechanism even though retrofitting cone roofs on existing floating roofs is infeasible and even though these tanks would be controlling emissions to a 99 percent reduction level.

Even if tanks after 1982 meet the RACT and LAER test, there is a fundamental question of equity regarding why a new tank constructed in late 1978 and a new tank constructed in 1982, each of which reduce uncontrolled emissions by 99 percent, should be treated so differently under this bill.

Tanks are not a unique case. A similar situation involves gasoline loading of tank cars and tank trucks. Some of these operations have been controlled since 1973. In general, these controls require the collection and recovery of gasoline vapors that are emitted as liquid fills the tank car or truck. Additional controls were required in 1979 with a final compliance date of year end 1982 which control emissions in excess of 90 percent. Under this bill, if the facility complied in 1981 and it emits 25 tons/year or is part of a facility that emits more than 25 tons/year, it must reduce its emissions by a minimum of 5 percent per year. There is no technology to meet this task.

Similarly, the bubble prohibition further limits the capabilities of sources to meet the requirements of this section. For example, in a tank farm with several tanks emitting more than 25 tons/year, no single tank could reduce its emissions. A tank could be shutdown to bring the entire tank farm to a lower emission rate, but the combination of the major stationary source definition and the bubble prohibition would forbid this limited alternative.

There is no magic line that assures that technologies on either new or existing sources prior to 1982 is substandard compared to that installed during and after 1982. The real issue is whether feasible technology exists to further reduce emissions; this is a RACT question not a matter which can be addressed with this across the board mandate.

In Houston, where active controls have been in place for many years before 1982 the potential inequities and onerous results of these provisions on sources which acted in good faith to expeditiously control emissions are appalling. Other areas could be equally adversely affected. There are some indications that the Los Angeles area may have required secondary seals on tanks in 1977. If so, none of these tanks would receive a credit.

Given that the options for control are in many instances limited or unavailable, the consequences of failure are equally unfair. Because this section--Section 172(e)(2)(C)--must be implemented by the State, failure to achieve the results would cause the imposition of sanctions. In addition, individual sources would be subject to excess emissions fees.

Excess Emissions Fees

This section provides that any major stationary source--greater than 25 tons/year of emissions--which fails to make its reduction target must pay a fee equal to the cost per ton of pollutant removed that would have been expended in order to comply or the economic value that a delay in compliance would have to the owner. The fee must be at least $5000/ton.

This concept appears to be predicated on the theory that there are readily available RACT options that are not being used because of cost. Current RACT has been in the $2000/ton level. It is a flawed theory however.

Consider again the tank example. A tank with a secondary seal has used the best available technology. Any tank in operation with secondary seals prior to 1982 must meet the reduction target or be fined. Since there is no additional technology, the fine would be based on the economic value of running the tank. The economic value in running tanks in a refinery is that refineries cannot operate without crude oil storage tanks and finished product tanks and intermediate storage tanks. Presumably, this section would require as an excess emissions fee the entire profit of the refinery. Under this circumstance there is no purpose in continuing to operate the refinery. Shutting down domestic refineries only benefits foreign competitors. Only the United States loses.

Similarly, the excess emission fees will only be assessed in areas with 10 or 15 year extensions of the attainment date. This has the effect of encouraging industries to shift operations to other areas to avoid fees. This concept of creating "pollution havens" has always been discouraged by the Clean Air Act. Yet, when operating facilities have already implemented rigorous controls, like secondary seals on tanks, their choices are limited. If the United States is lucky, the operational shifts will be to other domestic "pollution havens". Unfortunately, for~~m~~ any of the industries affected by these requirements the choice will be between continuing an operation in the United States or using foreign capacity. Again, only the United States loses. Another flaw with the excess emissions fee theory is the inability to determine emissions with this level of accuracy. In particular, hydrocarbon emissions are calculated estimates. While the calculation process has been revised, enhanced, and improved over the years, it is still subject to uncertainty levels--on the order of 10 percent. When considering the idea of emissions fees, it is essential to provide some clear and acceptable method of determination.

New Source Offset Requirement

The bill requires new sources in areas with 1997 or 2002 attainment dates to offset their emissions two for one. It is interesting to note that in Clean Air bills reported from the Environment and Public Works Committee in 1982 and in 1984, two for one offsets were the construction sanction. Under the provisions of this bill, it will still serve as an effective construction sanction--a de facto sanction even as a State tries to implement the other provisions of the bill.

The massive further reduction requirements of the bill will eliminate any remaining emission reductions other than closing existing operations to build new ones. In Houston because existing sources are so tightly controlled--in many cases there are only minute differences between new source requirements and existing source requirements. A new source could be constructed only by closing down existing capacity of roughly twice its own.

This is a clear formula for economic stagnation in an area which has been among the most vigorous in the world--an area which is now suffering its worse economic problems since the days of the Republic of Texas.

The implications of these requirements are potentially devastating to the objectives of the Committee bill in other areas as well, particularly taken in conjunction with other requirements of this title. For example, Title III of the bill requires diesel fuel to meet certain sulfur limits. These limits cannot be met without the modification of existing refineries many of which are located in Houston and other nonattainment areas. Consequently, as these refineries are trying to permit what would probably be a major stationary source under current law and would clearly be one under the Committee bill, they will be confronted with this task at the same time that they must acquire two for one offsets from a base (1) that is already controlled to essentially LAER levels, (2) that is subjected to annual percentage reductions in stationary source emissions, and (3) that is subjected to excess emissions fees for continuing to operate. This confluence of constrains produces a situation in which construction of the necessary diesel fuel desulfurization facilities appears impossible.

SANCTIONS

General

Apparently, under this bill the sanction philosophy for failure to meet largely unachievable goals is to stifle economic growth, to prevent the construction of new more environmentally sound facilities, and to undo the benefits achieved by the Clean Water Act. Public policy on the environment is the greatest loser under these sanctions.

Neither the construction ban nor the highway sanction change in basic concept from current law. The new sanction is a prohibition of new sewer hook ups to publicly owned treatment works. Two of these sanctions are designed to be automatically implemented--the construction ban and the sewer hook up prohibition.

These new sanctions are further indicators that even sanctions under the current law are better than the options under the Committee bill. Because the bill has so many hurdles that most areas cannot meet, these sanctions appear more inevitable than those in current law. And because of the basic changes to the bill, these future sanctions will be worse than the current ones. The construction ban will apply to smaller sources; the highway sanction will be no different than current law; sewer hook up prohibitions are more onerous than limitations on construction grants under the Clean Water Act.

Incentives, if properly developed, might be a useful tool to encourage greater efforts to seek attainment; sanctions largely serve to impose such a great threat that Federal agencies usually seek to avoid imposing them. The bill would be well served if the Committee would consider incentive oriented ideas instead of continuing the failed theory of sanctions.

Sewer Hook Ups

The one new item in the list of sanctions is a ban on sewer hook ups. This could have severe consequences for the City of Houston in several ways, including the following:

1. Existing city bond issues could be jeopardized, threatening the city's bond rating and upsetting municipal bond financing generally.

2. The future possibility of bond financing for wastewater improvements would be jeopardized or eliminated.

3. Slum clearance and/or urban redevelopment projects would be jeopardized or eliminated.

4. Septic tank use might increase in suburban areas, to the detriment of public health.

5. Use of small treatment systems would be increased; past experience has shown that these systems tend to be less reliable after several years and the wastewater must be rerouted to larger--typically city run--wastewater systems. Prohibition of rerouting would be detrimental to public health.

6. Building and construction activities would be greatly curtailed, adversely affecting employment and provision of needed facilities and improvements.

Sewer and sewage treatment plant improvements have been financed in the past by a combination of federal grant funds and local bond financing. Prior to the mid-1970's, Houston used general obligation bonds. Then, the Wastewater Division was made an enterprise fund, after which Houston used revenue bonds. If projects financed by general obligation bonds were originally planned on the assumption that new sewer hook ups would provide revenue, then a ban on hook ups would make it necessary to use general tax revenue for debt service. If original financing was by revenue bonds, then a reduction in revenue would lead to default. Either result would have a major adverse effect on the city's bond rating and city finance generally.

Future financing would be adversely affected if no new hook ups could be used to increase revenue. Either no revenue bond financing would be possible, or interest rates would be exorbitant because of the increased risk.

Slum clearance and urban redevelopment projects cannot be planned and undertaken unless sewer facilities are available. If no hook ups are allowed, such projects would not be possible. If existing hook ups could be retained, it would be difficult to plan redevelopment projects that would have to utilize the same sewer connections as the slums that were torn down. Redevelopment areas probably could not succeed, because new construction would have to be based on higher population density because of land costs.

The demand for new housing would not vanish simply because of a ban on new sewer hook ups. In suburban areas, new construction would have to utilize septic tanks or small self contained treatment systems. Either can increase the risk to public health. Currently, one of the wastewater treatment problems confronting the Houston area is absorbing wastewater from inadequate small treatment systems at suburban developments.

It is truly hard to believe that the Congress wants to create a new sanction designed to risk public health, hurt the poor, and damage delicate city financing solely for the purpose of penalizing areas for failing to meet unachievable requirements.

MARINE LOADING EMISSIONS

This bill amends Section 110 of the Clean Air Act to authorize any State or local air pollution control agency to regulate emissions from vessels in port. The Houston area has been involved in deliberations over the wisdom, safety, effectiveness, feasibility, and cost of controlling marine vapor emissions since 1973. There are serious technological and safety issues that must be resolved before regulation of vessels should take place. Failure to appropriately resolve these issues can result in public endangerment from explosion and fire well above any risk or health impairment that may result from current emissions. No individual State or local agency is the appropriate control entity to address these emissions. If regulation is justified, it should be undertaken through the U.S. Coast Guard with participation from the EPA. The Coast Guard has the responsibility for port safety which is essential in dealing with this type of emission.

Comments

1. § 102(b) - New Definition of Reasonably Available Control Technology (RACT)

- RACT would continue to be "reasonably available" in name only. Under the new definition it would be more accurate to describe it as MACT, or "maximum achievable control technology."
- In the scheme of the Clean Air Act, RACT is intended to be a means available to the states for achieving compliance with the National Ambient Air Quality Standards. The language in the proposed definition requiring EPA to take into account the "potential toxic character" of hydrocarbon emissions is inconsistent with this purpose, and will make RACT determinations infinitely more difficult. What "taking into account" the "potential toxic character" of emissions would entail is unclear, and the weight to be given to this factor is not indicated. Control of air toxics is, and should continue to be, addressed separately in the Clear Air Act; it is irrelevant to the ozone attainment issue and would simply constitute unnecessary baggage for the nonattainment program.

- Under the current regulatory definition of RACT at 40 CFR § 51.1(o) state agencies are directed to consider social and economic impact, and alternative means of attaining standards. RACT is also tied to the concept of "reasonable further progress". Under the proposed statutory definition these criteria would no longer be considered.
- The new RACT definition would apply to any "significant" source or class of sources; however, there is no elaboration of what constitutes significance in this context, either for individual sources or for a class of sources. Arguably it would reach very small sources in view of the reduction, in proposed § 171(5), of the cut-off for classification as a major source down to 25 tons.
- The new RACT must be implemented and enforced through a permit system for all "stationary sources." Again there is no threshold; all sources that are not de minimis may be covered.
- Under the proposed new § 178(c)(1), RACT requirements would be extended to attainment areas within the newly established ozone transport regions; in addition, emissions

trading and bubbles would apparently be prohibited in such regions.

2. Section 102(d) - Control Technique Guidelines

- There is no mechanism to force EPA to issue CTGs within the two year period stipulated. If they fail to allocate the scarce resources to do so (they have already been noticeably unenthusiatic about additional CTGs) then each source (not necessarily just major or significant ones) would have to be reduced 90 percent from uncontrolled emissions.
- It is important to allow a period of repose between the time for CTG issuance and any sanction which would occur from the failure of EPA to act in a timely fashion, so that the regulated community will not automatically suffer the consequence of EPA's inaction. EPA must be legally required to act -- otherwise they have no incentive to do anything other than husband their resources, rather than expend them on actions about which they have been noticeably unenthusiastic.
- The 90 percent reduction would be deemed a requirement of an applicable implementation

plan, if EPA failed to publish within two years, therefore numerous sources would be in violation of plan requirements -- exposing themselves to suits and penalties.

- It is important to provide input by the regulated community and others into the development of CTGs because of fairness, avoidance of impractical formulations, and the potential adverse consequences of EPA's actions or inactions. The proceeding is more akin to a major rulemaking and should be according the procedural dignity thereof which is bestowed on other major actions under the Clean Air Act.

2. Section 304 - Federal Hydrocarbon Emission Controls

- One significant feature of the standards and limitations to be established under this section is that they could apply to the application of a product as well as its composition.
- The regulations would, at a minimum, have to achieve the degree of emission reduction achievable through RACT. RACT, of course, is intended to be an area specific requirement, not a uniform national standard. RACT may differ from nonattainment area to

nonattainment area. A possible interpretation of proposed $ 130(b) is that the national standard would have to be equivalent to the most stringent RACT adopted anywhere in the country, even though RACT for Los Angeles, for example, may be totally inappropriate for other areas. As a practical matter, the combined effect of this section and the new definition of RACT would be to create a national lowest achievable emission rate (LAER) for those categories of hydrocarbon sources that are covered.

- $ 130(b) only requires EPA to consult with affected industry and certain federal governmental entities in promulgating regulations for commercial solvents and metal parts coatings in military specification applications and aerospace industry applications. This provision should be broadened to require consultation with affected industry for all categories of sources.
- If national hydrocarbon controls are to be promulgated for categories of sources, they should be subject to the same statutory criteria that apply to new source performance standards, i.e., they should be adequately demonstrated and take into consideration cost and non-air quality health and environmental impact and energy requirements.

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ICF INCORPORATED

October 30, 1987

MEMORANDUM

TO: Rob Brenner, EPA

FROM: Bruce Braine, ICF

SUBJECT: Estimated Utility SO_2 Emission and Cost Consequences of the Recently Revised Mitchell Bill

---

You have requested that ICF review a set of revisions to the Mitchell Bill which were included in the most recent version of the bill. Accordingly, this memo analyzes these revisions and compares them with the previous version of the bill. The analysis focused on the SO_2 reductions at electric utility powerplants under the bill. A comparison of the impacts under the earlier version of the Mitchell bill (i.e., the Committee Working Paper dated 7/10/87) and the effects of the recent amendments are summarized below. Because the analysis was conducted over a short period of time, the estimated cost and emission impacts should be viewed as approximate:

- The revised Mitchell bill as reported from committee would have a different pattern of utility emission reductions and utility costs over time than the earlier version of the bill (see Table 1 on next page). In the near term (1993-95), there would be some interim emission reductions and costs (versus none required in the previous bill); in the intermediate term (1996-99) emission reductions and costs would be lower; and in the long term (after 2000) emission reductions and costs would be somewhat higher. The net effect would be slightly less utility SO_2 reductions in cumulative terms between 1993 and 2010 (207 million tons versus 210 million tons in the previous bill) with about 10 percent lower present value of utility costs over that period ($63 billion versus $70 billion).

- While the revised bill is estimated to result in lower utility costs than the previous bill over the 1993-2010 period, this would largely result from the amendment "stretching out" final compliance with the "12 Million Ton Reduction" until 2000. In 2000, utility annual costs would still be very high - $8 billion versus $9 billion under the previous bill and in later years would be expected to be even higher because of the 40 Year NSPS requirement. Further, costs to the industrial sector are not included in

TABLE 1

APPROXIMATE UTILITY SO_2 EMISSION REDUCTIONS AND COST IMPACTS UNDER PREVIOUS AND REVISED BILL OVER TIME

	Annual Utility SO_2 Emission Reductions (millions of tons below "base case" levels)					Cumulative Reductions
	1993-95	1996-97	1998-99	2000	2010	1993-2010
Previous Bill	--	14	14	14	14	210
Revised Bill	6	6	12	13	15	207

	Change in Utility Annualized Costs (billions of '87$)					Change in Present Value of Costs (in billions of '87$)
	1993-95	1996-97	1998-99	2000	2010	
Previous Bill	--	9	9	9	9	70
Revised Bill	2	2	6	8	11	63

the impacts shown in Table 1. The 40 Year/NSPS would increase costs to the industrial boiler sector substantially after 2003 by about $1-2 billion annually. This increase would effectively offset the 10 percent cost reduction in the utility sector. Thus, the total costs of the revised bill would not be significantly different than the previous bill.

- There are seven amendments contained in the revised bill. These include:

  -- (1) interim reductions in 1993 and 1998 of 5 and 10 million tons below '80 levels with final 12 million ton compliance in 2000,

  -- (2) requiring all plants to meet NSPS upon reaching 40 years of age, beginning in 2003,

- (3) allowing lower emitting states to meet an 0.9 lb. rate in lieu of the reduction requirements (except for the 40 Year/NSPS).
- (4) eliminating emission offsets for post-1981 plants,
- (5) allowing emissions bubbling for the 30 year/ 0.9 lb. option.
- (6) extending compliance deadlines for clean coal,
- (7) permitting interstate trading across a utility system.

The first two amendments would have a relatively significant effect on utility emission reductions and costs with the "stretch out" provision reducing total costs and the 40 Year/NSPS increasing these costs after 2003. The third provision (the 0.9 lb. rate for lower emitting states) would reduce emission requirements and costs moderately with about 0.7-0.8 million tons less reductions and about $0.5-1.0 billion lower costs in 2000 (largely in Western and Gulf states). The remaining amendments would not have any significant impact on emission reductions or costs.

- While the final four amendments ordinarily would increase flexibility and reduce costs, under a moderate emission reduction bill, they do not affect emission or cost impacts significantly under the Mitchell bill. This is primarily because the major provision of the bill requires final compliance with a "12 million ton SO_2 reduction" below 1980 levels by 2000. Because this reduction requirement is very stringent, there is relatively little advantage gained in (1) extending compliance deadlines for "clean coal" (since it will be technically difficult to achieve the high level of reductions with most promising clean coal technologies), (2) allowing interstate trading when virtually __all__ states reduction costs are high, (3) increasing flexibility in the 30 year/0.9 lb. option when the reduction requirements that must be achieved under the "12 Million Ton" reduction are generally more stringent than the 0.9 lb. limit on a plant-by-plant basis, and (4) removing the emission offset provision for new sources since most states still have to achieve their share of the 12 Million Ton Reduction __below 1980 levels__ for total SO_2 emissions. Only those with no allocated reductions are exempted by this provision.

- Finally, it should be noted that this cost analysis did not consider key administrative and implementation costs. Because the revised Mitchell bill has numerous requirements which are imposed upon states and utilities, it would likely be very difficult and costly to implement. More importantly, under the current version of the bill, states and individual utilities would face constantly changing SO_2 emission reduction targets requiring changing compliance strategies, often at the same plant, over a relatively short period of time:

  -- In 1993 - 5 million ton reduction

  -- In 1998 - 10 million ton reduction; 0.9 lb. average rate also required

  -- In 2000 - 12 million ton reduction

  -- After 2000 - Further reductions to offset growth or 30 Year/0.9

  -- After 2003 - 40 Year/NSPS

  Thus, within only a 10 year period, five separate compliance actions would need to be taken, in some cases at the same plant. As a result, many states may decide to require tighter limits such as the NSPS earlier in order to simplify implementation of the revised bill. This could result in even higher costs than noted herein.

A brief discussion of each of the amendments and their estimated impacts is attached.

Interim Reductions and Compliance Stretch Out

The most significant amendment to the Mitchell bill is the provision which stretches out final compliance with the "12 Million Ton Reduction" until 2000 (versus the previous bill's requirement that the final reductions be met in 1996). The amendment requires a 5 million ton reduction below 1980 levels in 1993, a 10 million ton reduction by 1998, and a 12 million ton reduction by 2000. The effect of this amendment would be (1) lower emission reductions and costs in the near term (1993-95) than required under the previous version of the bill; (2) lower emission and cost impacts during the 1996-1999 period (particularly during 1996 and 1997 when a 5 million ton reduction below 1980 levels is required versus a 12 million ton reduction below 1980 levels in the previous version of the bill). In 2000 and in later years, this amendment does not result in different reduction requirements than the previous Mitchell bill.

The impact of the amendment on cumulative emission reductions and costs over the 1993-1999 period (the period affected by the amendment) is shown below:

Impact of Compliance "Stretch Out" Amendment

	Previous Mitchell Bill	Revised Mitchell Bill	% Change
Cumulative Utility SO_2 Emission Reductions - 1993-1999 (millions of tons)	56	54	-5%
Present Value of Utility Costs - 1993-1999 (billions of '87$)	23	15	-35%

The phasing of reductions while lowering cumulative emission reductions slightly would reduce utility cost impacts by more than one third over the 1993-99 period. This occurs because the interim reductions under the new bill are much more cost-effective than the very high costs associated with the final reduction requirements in 2000. The effect of the provision over the entire 1993-2010 period examined is to reduce costs by more than 10 percent.

40 Year/NSPS

While the compliance "stretch out" amendment reduces costs during the 1993-1999 period, the 40 Year NSPS amendment increases costs in the longer term. This amendment requires all powerplant units upon reaching 40 years of age, as of January 1, 2003, to meet NSPS Subpart Da regulations (i.e., 70-90 percent SO_2

removal for coal plants, 0.8 lb. SO_2 limit for oil plants). This amendment would result in about 150-170 gigawatts of retrofit scrubbers (versus roughly 100 gigawatts under the 12 Million Ton Reduction requirements under the previous version of the bill). The 40 Year/NSPS would also result in higher emission reductions in 2010 (about 15 million tons versus an estimated 14 million tons under the previous version of the bill) and significantly higher annual costs impacts (about 11 versus 9 billion per year in 2010), reflecting the greater number of retrofit scrubbers, which are generally costly on a dollar per ton SO_2 removed basis.

Note that this assessment of the 40 Year/NSPS amendment does not include rather significant additional impacts in the industrial boiler sector. By 2010, this provision would require all 1970 or earlier industrial boilers to install scrubbers. A very rough estimate suggests that this provision could result in additional costs to this sector of $1-2 billion annually by 2010.

0.9 lb. Annual Rate Allowance in Lieu of Reduction Requirement

For states with less than 150,000 tons of utility SO_2 emissions in 1985, an 0.9 lb. annual emission rate and a 250,000 ton total SO_2 emissions cap can be met in lieu of the reduction requirement under the revised bill. Most Western states and a number of Eastern states would qualify under this provision, although some which qualify such as Wyoming would not be required to reduce SO_2 emissions in the current version of the bill either, and thus would not be affected. Others which qualify, such as Virginia, Louisiana, Arizona, and Washington, would find the total emissions cap restrictive. However, in total about 0.7-0.8 million tons less reductions would result due to this amendment because many qualifying states can more easily meet an 0.9 lb. SO_2 annual rate than an emission tonnage target.

Elimination of the Emissions Offset Provision for New Plants

The revision of the emission offset provision in Section 182(b)(4)(E) of the bill to exclude post-1980 sources would have a limited effect on the reductions and costs under the bill. This is because the goal and major requirements of the bill as stipulated in Sections 181 and 182b(1)B is a 12 million ton reduction in SO_2 emissions below 1980 levels by 2000 with interim reductions required by 1993 and 1998 (allocated to individual states based on 0.9 lb. excess emissions). Almost all states have some reduction requirement under the allocation scheme and thus would still be subject to an effective cap on their emissions below 1980 levels. Only some lower emitting states would be subject to the revised emission cap (i.e., those with no reduction requirement - VT, CT, RI, DC, LA, OK, ID, CO, UT, AZ, NV, OR, and CA). The revised cap would only cap emissions from pre-1981 sources at 1980 levels. However, in most of these states, the 0.9 lb. annual rate allowance is less stringent and the incremental effect of this amendment would result in only about 0.1 million tons less reductions.

Permitting Flexibility Under the 30 Year/0.9 lb. plant by plant limit

An ambiguous section of the bill (Section 183) pertains to offsetting emissions from new sources. The July 10 version of the Mitchell bill appears to require all states to maintain the 12 Million Ton Reduction below 1980 levels after 1996 by either (1) offsetting all emissions growth from new sources on line after January 1, 1996, or (2) requiring all powerplant units upon reaching 30 years of age to meet an 0.9 lb. limit on a 30 day average to the extent these plants are not already required to reduce to an 0.9 lb. limit under the 12 Million Ton Reduction. The revised bill apparently would permit states to achieve the additional reductions that would result from the 30 year/ 0.9 lb. on a unit-by-unit basis at other plants (i.e., emissions bubbling)[1] although emission reductions due to changes in powerplant utilization or retirements would not be counted in the trades. Because of the stringency of the 12 million ton reduction requirement this revision would have relatively little effect. Most plants would already have to meet an 0.9 lb. limit or lower under the "12 million ton" reduction requirements. Further, those few cases where emissions trading could take place, trades would be limited by the restrictions on plant utilization and retirements. Accordingly, bubbling the additional emissions reductions associated with the 30 year/0.9 lb. would result in little, if any, cost savings.

Extension of Compliance Deadline for Clean Coal Technologies

Extending the compliance deadline for clean coal technologies (i.e., permitting powerplants to wait until January 1, 1996 to enter into commitments to install clean coal technology) is not likely to significantly reduce costs of the bill. Most retrofit clean coal technologies which appear most promising (e.g., sorbent injection) are likely to be limited to between 50 to 75 percent removal. In many high sulfur coal producing states (which are the most likely candidates for such technologies) effective percent reductions of 80-90 percent are required from existing coal plants burning high sulfur coals to achieve the "12 million ton" reduction target by 2000. Thus, the extension of the deadline for clean coal technologies is likely to have only a limited effect.

Permitting Interstate Trading of Emission Reductions Within a Utility System

While additional trading flexibility is provided by this proposed revision, there is likely to be little additional cost savings. This is because utility systems which span state lines are usually centrally dispatched and can under the current bill achieve effective emission trades through changes in the utilization of their powerplants. Relatively modest cost savings would result in the 1993-1997 period (less than $0.1 billion) when an effective 6 million ton reduction is required. However, when reduction requirements reach 12-15 million tons after 1997, virtually no cost savings would result. This is because interstate emissions trading has relatively little value when all states are faced with very stringent reduction requirements. This is particularly true in the case of the three largest coal based utility systems (AEP, TVA, and Southern Co.) which would have very high marginal costs of SO_2 reduction in all the states in which they operate under the reduction requirements after 1997.

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[1] This would be presumed to take effect in the revised bill in 2000 after the Twelve Million Ton Reduction requirements are achieved. Note the language in the bill suggests that this would occur after 1/1/98, but this would be before provisions needed to offset emission increases would be necessary.

ADDITIONAL VIEWS OF MR. PRESSLER

Larry Pressler

I support improving our nation's air quality and bringing ozone nonattainment areas into compliance with clean air standards. Title I of the bill includes many necessary provisions which would help to assure all Americans that the air they breathe is safe. These include the alternative fuels provisions, inspection and maintenance and other provisions relating to nonattainment areas. The purpose of this legislation is to address the nonattainment problem experienced by many large metropolitan areas. It is estimated that approximately 72 areas will not meet the December 31, 1987 attainment deadline. The legislation addresses this problem, but unfortunately it goes well beyond it.

Title I of the bill is the only title that deals with nonattainment areas. The remainder of the bill, in many instances, imposes extremely costly regulations on attainment areas with only minimal benefits. In recent years great strides have been made in improving air quality at a cost of approximately $100 billion. Estimates of the total cost of this bill range from $20 billion to $50 billion annually. I am concerned that the U.S. economy cannot afford to pay this price and consumers will be unwilling to assume the additional cost. This is especially true for areas that already are in attainment. The impact of the bill on the competitiveness of U.S. industries is another major concern. I support clean air, but also support a strong economy. We must try to strike a balance between these goals. Unfortunately, in most cases, the committee did not consider fully the economic cost of many of the bill's provisions.

The Committee bill would address the local nonattainment problem by enacting dozens of new federal requirements that will apply in areas that do not need them or that might prefer to follow other more cost-effective paths to improve air quality.

A good example of the costly and unnecessary burdens that can arise from the Committee's approach can be found in Title III provisions for another wave of national vehicle emission standards for hydrocarbons, carbon monoxide and nitrogen oxide. These standards would achieve little additional reductions compared to the 96 percent reductions for carbon monoxide and hydrocarbons, and 76 percent reduction for nitrogen oxides, already called for under the 1977 Act. The need for these changes has not been demonstrated. The current act requires EPA, through the Clean Air Act Scientific Advisory Committee, to review and revise the standards. The Scientific Advisory Committee has not determined that a change in standards would be necessary or beneficial. Moreover, the tighter standards and other Title III requirements are not achievable without higher new car prices and sacrifices in vehicle driveability and fuel economy. The result may well be that consumers will keep their current cars longer rather than buy new cars that cost more or are less desirable in other respects--a result that could actually worsen air quality. Finally, well over 90 percent of the actual emissions reductions required by these new standards would occur in areas that are or will be in attainment when the reductions begin making a measurable impact on air quality.

The Title III provisions would be very costly while providing limited benefits. The Congressional Research Service of the Library of Congress has estimated that the annual cost of the mobile source provisions could reach well into the $20 billion range. CRS also has estimated that domestic carmakers could lose up to $10 billion in annual sales and that more than 200,000 autoworkers could lose their jobs.

In light of the huge federal deficit and the current efforts to reduce federal spending, I am very concerned about the cost of this bill to the federal government. The bill authorizes a number of new grant programs, a Chemical Safety Board, a clean coal program and many studies. The total amount authorized is approximately $3 billion. This does not include the cost of studies and other actions the bill directs EPA to undertake. The high cost of this bill needs to be considered more carefully.

In addition to these overall concerns about the cost of the bill, I also am concerned about a number of specific provisions. Efforts to reduce sulfur dioxide emissions should be encouraged. However, the reductions should be made where the vast majority of emissions occur. Sulfur dioxide emissions in western states are very minimal. Yet, the cost of making such reductions is higher in the west. Limiting the acid rain portion of the bill to the 31 eastern states would dramatically reduce the cost of the bill while still producing significant reductions in sulfur dioxide emissions.

This bill has the potential for impacts on farmers and small businesses. The desulfurization of diesel fuel would significantly increase the cost of diesel fuel for farmers. Title V of the bill also could have a dramatic impact on the cost of fertilizer used by farmers and subject small businesses to excessive federal regulations. I was pleased that the committee approved an amendment exempting farmers from certain regulations on anhydrous ammonia. However, I am concerned that several other provisions would adversely affect farmers. Several of these provisions are well intended but they would be impossible to administer effectively.

The high cost of the mandatory emissions control warranty provision and its questionable environmental benefit also are of great concern. The Congressional Research Service estimated the cost of the provision at $240 million. The Environmental Protection Agency has stated that recall and in-use testing programs would achieve the same emissions reductions. In addition to stimulating higher new car prices while producing very low emissions reductions, this provision also threatens the livelihood of thousands of small businesses and independent auto repair shops. This seems to be a large price to pay for no real emissions reduction.

During consideration by the full Senate, the focus of this bill should be restored on nonattainment areas and the cost of the bill should be reduced.

MINORITY VIEWS OF MR. SYMMS AND MR. WARNER

Steve Symms

John Warner

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Report of the Committee on Environment and Public Works:

THE CLEAN AIR STANDARDS ATTAINMENT ACT OF 1987
MINORITY VIEWS

INTRODUCTION

The Clean Air Act is, without a doubt, America's first and foremost comprehensive environmental statute. The Administrator of the Environmental Protection Agency (EPA), Mr. Lee Thomas, testified earlier this year that the current Clean Air Act "has served us well in the past and is capable of protecting our nation's air quality -- and our people's health and welfare -- into the foreseeable future."1/ There are two primary reasons for the credibility and success of the existing program. First -- flexibility: the Act promotes a federal/state partnership based on a formal finding which remains as valid today as it was when Congress made it in 1970 : "that the prevention and control of air pollution at its source is the primary responsibility of states and local governments."2/ Second -- sound science: the Act generally contemplates that new regulatory burdens will be imposed on the business community and the public only after questions of need, effectiveness, and technical feasibility have been answered to the best of the science's ability and exposed to full and open public scrutiny.

The Clean Air Standards Attainment Act reported by the Environment and Public Works Committee (hereinafter referenced as

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1/ Testimony of Lee M. Thomas, Administrator, Environmental Protection Agency, Before the Subcommittee on Environmental Protection, Senate Committee on Environment and Public Works, July 22, 1987, p. 1 ["Thomas testimony"].

2/ 42 U.S.C. sec. 7401(a)(3)

the Committee bill) **marks a substantial and unjustified departure from these vital principles.** Few, if any, of the "new" programs called for under the bill are not already fully authorized under current law. The Congressional Research Service, responding to Senators' concerns about the bill's exhorbitant cost and unknown effects on American competitiveness, summarized:

> Even where the bill grants EPA significant new authorities, as in the acid rain and air toxics titles, the current Act contains authorities that could be used. . . The draft bill forces EPA decisions and actions by setting deadlines, specifying procedures, and spelling out stringent legislative standards to address recognized problems and issues.[3]

Consequently, the real impact of the Committee bill is to substitute legislative fiat for the informed judgment of the EPA and to usurp local pollution control prerogatives by imposing mandatory new federal programs.

The fact that **EPA opposes every major provision of the bill** should alert this Committee to its failure to address the extraordinarily complicated and intricate scientific and technical judgments that are needed to protect the health of all Americans without imposing unnecessary regulations. Even worse, the Committee's bill in many respects appears to reflect a philosophy that holds such judgments to be superfluous in its hasty pursuit of regulation merely for regulation's sake.

In a mythical world of unlimited resources and unanimously ranked priorities, we would have the luxury of ignoring scientific data and indiscriminately controlling emissions regardless of health benefits and feasibility. But in the real world of enormous budget and trade deficits, an uncertain economic picture, and domestic industries locked in a fierce struggle for survival with foreign competitors, unnecessary federal programs can mean lost jobs, depressed communities, higher cost-of-living, and lower quality of life. Unfortunately, it appears that the Committee's bill will have all of these effects in considerable proportions.

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[3] Congressional Research Service, Summary Discussion of a Draft Bill to Amend the Clean Air Act, (CRS - Library of Congress - 87-762 ENR, September 15, 1987), p. 2.

Cost estimates developed by the Congressional Research Service (CRS) and EPA for some (but by no means all) of the provisions of the bill suggest that the nationwide cost could be as much as $40-50 billion per year.4/ Table #1 is a side-by-side comparison of EPA's, CRS's, CBO's, and OTA's cost estimates of the Committee bill. For purposes of comparison, the Commerce Department estimates that the Nation currently spends about $31 billion annually on all air pollution controls.5/ The $40-50 billion/year additional cost for the Committee bill thus would **raise the Nation's annual air pollution control burden to $70-80 billion, approaching a tripling of current costs.**

4/ Information on total costs was gathered from separate Congressional Research Service, Congressional Budget Office, and Office of Technology Assessment reports on Titles I - V of the Committee Working Paper, which served as the mark-up vehicle for the Committee. The reports responded to requests coming from 29 Senators.

5/ Bureau of Economic Analysis, United States Department of Commerce News, "Real Pollution Abatement and Control Increased Again in 1985" (June 3, 1987), at p. 2.

Table # 1: Potential Annual Costs of the Committee Bill

POTENTIAL ANNUAL COSTS OF THE
CLEAN AIR STANDARDS ATTAINMENT ACT OF 1987[1]
(in billions)

	EPA		CRS		CBO		OTA		TOTAL
	Low	High	low	high	low	high	low	high	potential
TITLE I: Nonattainment	3.12	3.12	4.8	10.26	-.-	-.-	6.37	7.37	11.8
Sec. 101(c) Stage II	-.-	-.-	0.34	0.51	-.-	-.-	0.17	0.17	0.51
Fleet Fueling	-.-	-.-	0.12	0.37	-.-	-.-	-.-	-.-	0.37
RACT	1.81	1.81	3.8	6.2	-.-	-.-	3.7	3.7	6.2
Traffic Control	-.-	-.-	0.1	1.22	-.-	-.-	-.-	-.-	1.22
Sec. 102(b) I & M	1.31	1.31	0.44	1.96	-.-	-.-	2.5	3.5	3.5
TITLE II: Acid Rain	7.77	11.0	6.0	9.0	6.2	10.6	-.-	-.-	11.0
TITLE III: Mobile Sources	1.67	2.62	2.68	9.0	-.-	-.-	(1.03)	(1.16)	10.23
Sec. 301(a-d) Standards	1.24	1.36	1.36	3.1	-.-	-.-	-.-	-.-	3.1
Sec. 301(e) Motorcycle	-.-	-.-	0.01	0.03	-.-	-.-	-.-	-.-	0.03
Sec. 301(f) Onboard	-.-	-.-	0.32	1.6	-.-	-.-	-.-	-.-	1.6
Sec. 303(a) Diesel Desul	0.23	0.51	0.2	2.8	-.-	-.-	-.-	-.-	2.8
RVP	0.2	0.75	0.45	0.45	-.-	-.-	0.1	0.23	0.75
Oxygenates	-.-	-.-	0.34	1.02	-.-	-.-	-.-	-.-	1.02
Sec. 304(a) Solvents	-.-	-.-	-.-	-.-	-.-	-.-	0.93	0.93	0.94
TITLE IV: NAAQS	-.-	-.-	2.2	5.0	-.-	-.-	-.-	-.-	5.0
TITLE V: Air Toxics	3.8	5.0	0.5	1.7	2.1	16.0	-.-	-.-	16.0
TOTALS	16.36	21.7	16.18	34.96					54.03

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[1] The cost estimates presented here are based on the Committee Working Paper prior to mark-up in the Full Environment and Public Works Committee. Some full committee modifications (such as the special treatment of coke oven and radionuclide emissions and the NOx standard for cyclone boilers) will reduce estimated costs. Others (such as the municipal waste incineration controls) will raise the cost of the bill above what is seen here.

This fact alone should have alerted the Committee that there may be something fundamentally wrong with the approach taken in this bill. If still more proof of the unsound nature of the Committee bill is needed, it can readily be found in the following examination of the many inefficient, unnecessary, counterproductive, or infeasible measures it would enact into law.

Even as we proceed with this review of the evidence overlooked, disregarded or trivialized in the Committee's consideration of the bill, we share the majority's goal of adequately protecting the public health from air pollutants. Nevertheless, we cannot agree that a comprehensive overhaul of existing legislation, as proposed in the Committee's bill, is appropriate or necessary, especially when it is evident that its purported benefits have simply been assumed, not proved, and certainly not reconciled with the breathtaking costs the bill would impose.

I. OZONE AND CARBON MONOXIDE NONATTAINMENT

A. No Need To Drastically Overhaul the Existing Statute

The Committee bill apparently assumes the ambient air quality standard attainment mechanism in the current Clean Air Act to have been a dismal failure and that, therefore, it is now time for Congress to substitute its judgment for that of EPA, state and local pollution control officials, supplanting their roles in defining scientifically sound national health goals and deciding how best to reach them. While there is considerable evidence that the deterministic approach of simply establishing rigid federal deadlines has failed, there is no basis for finding that the basic federal/state partnership established in the current law is flawed. Quite to the contrary, the record before this Committee reveals that the existing legislation is working well and provides ample authority for ensuring that the public health is fully protected.

No one disputes that ambient ozone and carbon monoxide (CO) levels are too high in some regions of the country and that continuing efforts are needed to attain existing health-based air quality standards. It is also undisputed that many areas could shortly face sanctions -- including economically stifling bans on construction of major new sources or modernization of existing sources -- regardless of whether or not they have made reasonable efforts to meet the existing deadlines. Importantly, EPA has stressed that "our incomplete success is not generally caused by State incompetence or lack of will" but rather by "the difficulty and complexity of the problem itself."[6]

In short, there is no doubt that some legislative action is called for, in particular to prevent the imposition of unfair and ineffective sanctions. But we have been presented with absolutely no justification for the Committee bill's harshly punitive wholesale revision -- and unbridled federalization -- of the basic structure of the existing statute. Indeed, great strides have already been made toward attainment, and continued progress can be expected in the next several years, as current regulatory programs ensure increasingly broad utilization of today's state-of-the-art emission controls.

1. Steady Improvement in Air Quality

In the case of carbon monoxide, emissions were reduced by 21 percent between 1976 and 1985.[7] The result has been steady progress toward attainment. Specifically, EPA data reveal a 36 percent reduction in composite average CO readings over the same period, and a 92 percent reduction in exceedances of the national standard.8/

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[6] Thomas testimony at 4 (emphasis added).

[7] EPA, National Air Quality and Emissions Trends Report, (February 1987), p. 3-19.

A 26 percent reduction in motor vehicle CO emissions over the 1976-85 period -- despite a significant increase in vehicle miles travelled (VMT) -- is responsible for nearly all this improvement. Indeed, the air quality benefit of the 1981 CO emissions standard for light-duty vehicles, which represents a 96 percent reduction in emissions from pre-control levels, is only now beginning to be reflected in ambient CO readings. Further substantial reductions are expected as vehicles equipped with the state-of-the-art controls required by this standard penetrate even more fully the on-the-road fleet. No wonder, then, that EPA data show ambient CO concentrations in recent years (1984-85) improving at a rate twice as high as in earlier years.9/

Likewise, a less striking but no less significant trend of improvement can be seen in the case of ozone. Between 1979 and 1985,10/ composite average ozone readings dropped 10 percent, and emissions of ozone precursors (volatile organic compounds, or VOCs) fell 12 percent, despite substantial growth in vehicle traffic and industrial activity.11/ Consequently, exceedances of the current national standard declined 38 percent over the same period.

8/ Id.

9/ Id.

10/ Because both the ambient standard and measurement techniques for ozone changed in the late 1970's, the 1979-85 time period is generally used for tracking progress in controlling that pollutant. See id. at pp. 3-31 to 3-32.

11/ Letter dated September 22, 1987, from Lee M. Thomas to John D. Dingell, at 4.

The magnitude and nature of ozone nonattainment in the United States is depicted in Figure #2 . California has by far the worst ozone situation, followed by Texas and the Northeast Coast. In the remaining 41 states, ozone concentrations exceed the standard by no more than about .04 to .05 parts-per-million (ppm), and only a handful of sites experience more than four one-hour ozone standard exceedances per year.

Again, reductions in motor vehicle emissions of VOCs have made a major contribution, falling by over 40 percent since 1973. As in the case of CO, the current hydrocarbon (HC) emission standard for light-duty vehicles, which also requires a 96 percent emission reduction from pre-control levels, has been in effect only in the 1980s. Hence, considerable progress toward ozone attainment will occur solely as the result of further penetration into the fleet of the state-of-the-art controls required by that standard.

Specifically, EPA has projected that the ever-growing coverage of existing VOC control programs -- including the application of new source performance standards (NSPS) and new source review requirements for major new or modified sources, together with the increased penetration of new vehicles meeting the current HC standard -- will produce attainment in about 40 percent (25 of 62) of today's nonattainment areas in roughly five years.[12] Moreover, these air quality gains are expected to bring a comparable number of other nonattainment areas to the brink of attainment. In these areas only moderate further measures may be needed to complete the final step.

For example, a recent survey reveals that the emission control systems on nearly half of the vehicles on the road today have been wholly or partially disabled by tampering, intentional or

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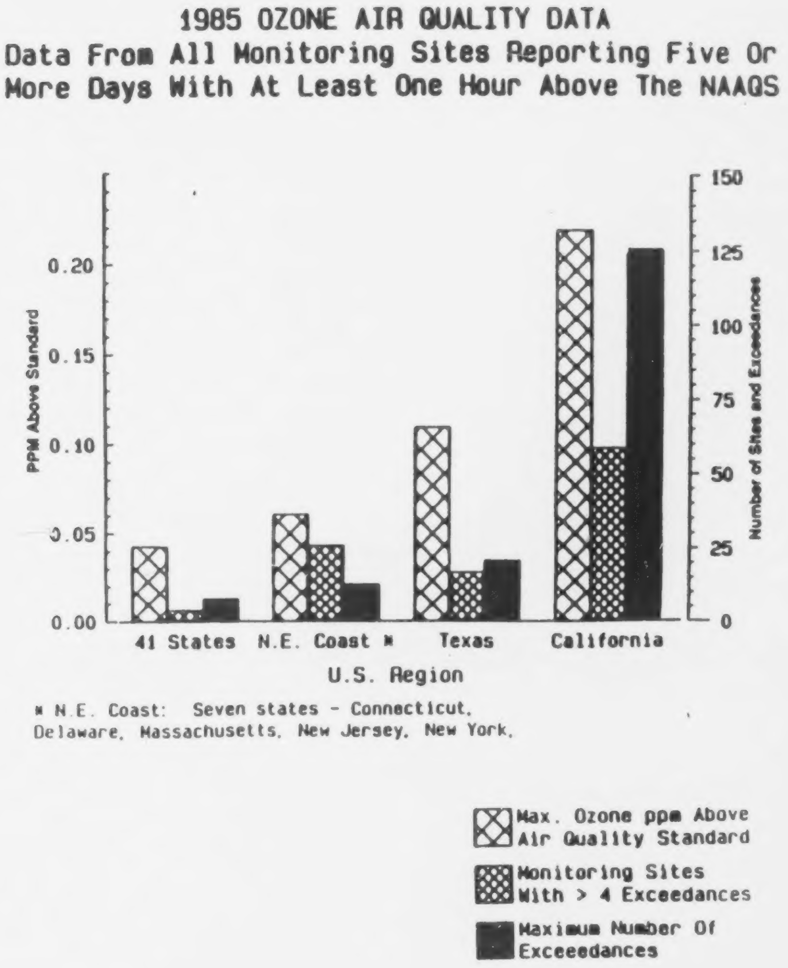
12/ Thomas testimony at 7-8.

Figure # 2: 1985 Ozone Air Quality Data



* N.E. Coast: Seven states - Connecticut, Delaware, Massachusetts, New Jersey, New York,

unintentional misfueling, or improper maintenance.[13] EPA estimates that inspection/maintenance (I/M) programs, which already are provided under current law, can lower VOC emission inventories by 4 to 6 percent.[14] Additional measures to prevent tampering and misfueling, endorsed recently by EPA, would make these I/M programs even more effective.[15] Indeed, EPA's estimates of the emission reduction benefits of further penetration of today's state-of-the-art emission controls are too low because they are based on the in-use performance of 1981 model year vehicles.[16] Thus, expanded I/M programs, coupled with programs to reduce tampering and misfueling, are likely to yield much greater inventory reductions and progress toward attainment than EPA now believes.

2. Remaining Public Health Risks

Once those areas that can reach attainment through existing or moderate further measures have been examined in proper perspective, what remains is an essentially localized nonattainment problem restricted primarily to a few areas in California, Texas and the Northeast corridor. To be sure, additional efforts will be needed to reach attainment in these regions, including, for example,

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[13] U.S. Environmental Protection Agency, Motor Vehicle Tampering Survey - 1986, September 1987, p. 3.

[14] Environmental Protection Agency, "Implications of Federal Implementation Plans (FIP's for Post-1987 Ozone Nonattainment Areas," (Draft, March 1987), P. V-45.

[15] Thomas testimony at 17.

[16] Statement of General Motors Corporation to the Senate Environment and Public Works Subcommittee on Environmental Protection, April 9, 1987, pp. 21-22.

"transportation control measures" forcing dramatic changes in the lifestyles of many Americans.

However, before the federal government arrogates to itself the exclusive power to dictate how these inherently local and politically controversial questions should be resolved, or even specifies rigid deadlines for attainment, it is important to analyze the nature and magnitude of the public health risks posed in these "chronic" nonattainment areas.

There is no indication that this analysis, so important to sound policymaking and legislation, has been performed. All we hear from proponents of the Committee bill is that millions of people live in nonattainment areas. For a variety of reasons, however, such blanket *in terrorem* statements greatly exaggerate the scope and severity of current public health risks.

First, the current approach to determining attainment is based on what statisticians would call an "outlier" or "extreme value." In the case of ozone, for example, the 0.12 parts per million (ppm) one-hour standard can be exceeded no more than three times in three years at one monitor for an area to be designated as an "attainment" area. This approach makes a region's attainment status unstable and unduly sensitive to unexpected or random events, particularly meteorological conditions. In many areas of the country where concentrations usually meet the standard, a few unusually hot summer days can be enough to result in a sudden reclassification to "nonattainment." As a result, some areas are or may be classified as nonattainment and required to institute emission controls to address an uncontrollable and unpredictable factor.

In addition, the use of the fourth highest reading over three years as the "design value" for purposes of control actually supplies little meaningful information even on the degree to which an area is out of compliance, much less a reliable benchmark for assessing health risk. For example, even in areas like Houston and New

York City, which are considered to be among the worst ozone nonattainment areas, the vast majority (99.47 and 99.64 percent, respectively) of the measured hours from 1981-1985 were below the standard.[17] While these data do not capture the full distribution of population exposures in these areas, they do suggest that, even in the worse "nonattainment" areas, the opportunities for excessive exposures may be limited in number.

Second, merely because an individual resides in an area designated "nonattainment" does not necessarily mean that he or she is actually exposed during these relatively infrequent exceedance episodes. Because the "nonattainment" designation can result from measurements taken anywhere in the region, the concentrations being recorded may not affect many individuals in the area. Furthermore, EPA has recently acknowledged that existing data "may not be representative" of general population exposures because some air quality monitors, especially for carbon monoxide, are located in places such as busy intersections or traffic islands, which have significantly worse microscale air quality problems than the majority of the surrounding area.[18] In addition, both ozone and carbon monoxide monitors are often located in places where few people actually are present for more than a few minutes at a time.

Again, the available monitoring data strongly support the indications that only a subset of all residents may experience the occasional high concentrations that trigger a nonattainment designation. Thus, in the New York, Detroit, and Washington, D.C. areas, nonattainment designations -- and the "designations" that largely determine how much additional emission control is needed -- are heavily influenced by readings taken from a single monitoring location.19/ In Detroit, for example, only one of eight monitors had enough exceedances during 1981-85 to be declared a nonattainment area.20/

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[17] American Petroleum Institute, Ozone Concentration Data Analysis (May 1987), at Table 1.

[18] Environmental Protection Agency, "Notes to Correspondents," August 27, 1987, p. 5.

Third, not all individuals exposed during these relatively infrequent exceedances are at risk. To the contrary, the standards are designed to protect especially susceptible subgroups, meaning that the overwhelming majority (well over 99 percent) of people residing in nonattainment areas can tolerate concentrations considerably above the standards with no ill effect whatsoever. Even with respect to the susceptible subgroups, the standards already incorporate (as required under existing law) a margin of safety below the lowest levels at which adverse health effects have been observed.

Moreover, the health effects of concern are mild, and reversible in character.21/ Although there have been many claims made to the Committee that young children and the elderly are at increased risk, available research has failed to produce scientific support for that concern.22/ While prudence dictates that steps be taken to address these concerns responsibly, the measures we choose should be selected carefully and with the understanding that such concerns, at least at the moment, are mostly theoretical.

Fourth, the significant air quality improvement expected in the next several years will not only bring many of today's nonattainment

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19/ American Petroleum Institute, Ozone Concentration Data Analysis (May 1987) at Figures 3, 7 and 11.

20/ Id. at Table 9.

21/ See EPA, Air Quality Criteria for Ozone and Other Photochemical Oxidants, Volume I (August 1986), at pp. 1-156 to 1-165.

22/ Id. at pp. 1-164 to 1-165.

areas into attainment -- they also will reduce the frequencies and levels of high readings in the few chronic nonattainment areas that remain. EPA has indicated that the increased penetration of today's stringent vehicle and stationary source controls, coupled with I/M programs and the other near-term attainment measures discussed above, will yield nearly a 40 percent reduction in current VOC emission inventories, even accounting for growth in vehicle miles traveled (VMT) and industrial activity.[23/] For chronic nonattainment areas, this represents 50 to 75 percent of the emission reductions needed to reach attainment, a level of progress that should have a dramatic beneficial effect on current exposure patterns.[24/] Even today, no region of the country outside of some areas in California, Texas, New York and Connecticut has expected exceedances of more than 10 days per year.[25/]

B. Title I Is Replete with Costly and Counterproductive Measures

As noted in the preceding discussion, to say that there are many areas in technical nonattainment with the standards, and that many people reside in those areas, badly overstates the nature and magnitude of the potential public health problem. In all but a few of today's "nonattainment" areas, exceedances appear to be small in number, brief in duration, and only marginally above the standards. Nor are there any reliable data showing that, in any region of the

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[23/] Implications of Federal Implementation Plans (Draft, March 1987), Table I-2 at I-7.

[24/] *Id.* at pp. V-7 to V-8.

[25/] Environmental Protection Agency, "Notes to Correspondents," August 27, 1987, Table 1.

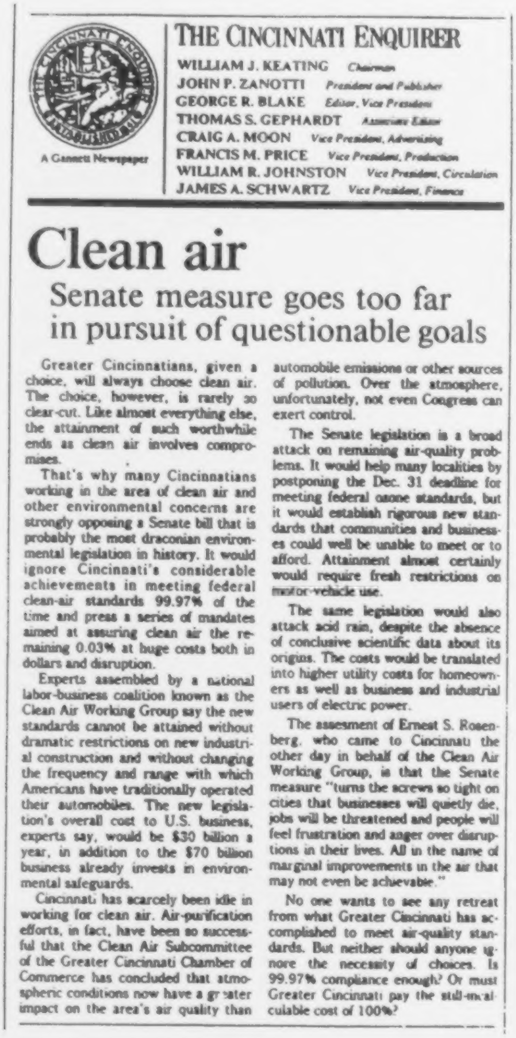
country, substantial numbers of persons in the susceptible groups the standards seek to protect are actually exposed long and often enough to face a significant likelihood of suffering even temporary, adverse effects. In short, examined from a public health standpoint, the existence of even a potential problem is confined to a relatively few urban areas, and even in those areas, the levels and frequencies of the exceedances are expected to decline dramatically in the next several years.

Evaluated against this perspective, the Committee's bill represents legislative overreaching of the highest order. Broadly speaking, the bill appears to be drawn on the premise that the only way to reach attainment is to legislate the strictest possible federal controls on every known source of VOCs, NOx and CO, and to extend those controls indiscriminately to current nonattainment areas without any regard for whether all or even some of these measures are truly needed for attainment, much less whether they represent the most appropriate path to attainment in light of unique local air pollution, economic, and political circumstances. The end result is a bill bristling with demonstrably unnecessary control programs that would impose extraordinary economic and social burdens on U.S. citizens and businesses. As the editorial board of the Cincinnati Enquirer put it:

> . . .many Cincinnatians working in the area of clean air and other environmental concerns are strongly opposing a Senate bill that is probably the most draconian environmental legislation in history. It would ignore Cincinnati's considerable achievements in meeting federal clean-air standards 99.97% of the time and press a series of mandates aimed at assuring clean air the remaining 0.03% at huge costs both in dollars and disruption.26/

26/ "Clean Air: Senate measure goes too far in pursuit of questionable goals," Cincinnati Enquirer, August 31, 1987. See Excerpt #3.

Excerpt # 3: Clean Air: Senate Measure Goes Too Far



THE CINCINNATI ENQUIRER

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Clean air

Senate measure goes too far in pursuit of questionable goals

Greater Cincinnatians, given a choice, will always choose clean air. The choice, however, is rarely so clear-cut. Like almost everything else, the attainment of such worthwhile ends as clean air involves compromises.

That's why many Cincinnatians working in the area of clean air and other environmental concerns are strongly opposing a Senate bill that is probably the most draconian environmental legislation in history. It would ignore Cincinnati's considerable achievements in meeting federal clean-air standards 99.97% of the time and press a series of mandates aimed at assuring clean air the remaining 0.03% at huge costs both in dollars and disruption.

Experts assembled by a national labor-business coalition known as the Clean Air Working Group say the new standards cannot be attained without dramatic restrictions on new industrial construction and without changing the frequency and range with which Americans have traditionally operated their automobiles. The new legislation's overall cost to U.S. business, experts say, would be $30 billion a year, in addition to the $70 billion business already invests in environmental safeguards.

Cincinnati has scarcely been idle in working for clean air. Air-purification efforts, in fact, have been so successful that the Clean Air Subcommittee of the Greater Cincinnati Chamber of Commerce has concluded that atmospheric conditions now have a greater impact on the area's air quality than automobile emissions or other sources of pollution. Over the atmosphere, unfortunately, not even Congress can exert control.

The Senate legislation is a broad attack on remaining air-quality problems. It would help many localities by postponing the Dec. 31 deadline for meeting federal ozone standards, but it would establish rigorous new standards that communities and businesses could well be unable to meet or to afford. Attainment almost certainly would require fresh restrictions on motor-vehicle use.

The same legislation would also attack acid rain, despite the absence of conclusive scientific data about its origins. The costs would be translated into higher utility costs for homeowners as well as business and industrial users of electric power.

The assesment of Ernest S. Rosenberg, who came to Cincinnati the other day in behalf of the Clean Air Working Group, is that the Senate measure "turns the screws so tight on cities that businesses will quietly die, jobs will be threatened and people will feel frustration and anger over disruptions in their lives. All in the name of marginal improvements in the air that may not even be achievable."

No one wants to see any retreat from what Greater Cincinnati has accomplished to meet air-quality standards. But neither should anyone ignore the necessity of choices. Is 99.97% compliance enough? Or must Greater Cincinnati pay the still-incalculable cost of 100%?

Taken from The Cincinnati Enquirer, August 31, 1987

1. Unnecessary Federal Control Programs

Perhaps the pivotal conceptual flaw in the Committee bill is that it would substantially "federalize" the current "state implementation" process for achieving ambient air quality standards without any inquiry into whether these new federally-prescribed minimum controls are necessary or appropriate in particular localities. The result is that few, if any, of the ozone and CO attainment measures in the Committee bill can be justified as necessary in very many of the regions in which they would apply.

The Committee bill imposes a long list of new mandatory federal programs on all areas that remain out of attainment after 1987,27/ whether or not these areas will otherwise reach attainment. EPA estimates that in areas that will attain solely by virtue of the existing Federal Motor Vehicle Control Program (perhaps 40 percent of all nonattainment areas), these provisions would impose entirely unnecessary costs of up to $3 billion over the next five years.28/

In many other areas, these federally-prescribed minima would require much more emission reduction than is needed for attainment.

a. Stationary source controls

For example, the Committee bill would require local governments in all post-1987 nonattainment areas to revisit major existing

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27/ The only exception is that SIPS for areas projecting attainment within 3 years (by 1990) would be spared the necessity of prescribing all three of the following controls and could be approved by adopting just one of them: (1) Stage II refueling vapor recovery devices, (2) enhanced I/M programs, and (3) "alternative fuels or power source" requirements for all "centrally fueled fleets" of 50 or more vehicles.

28/ Thomas testimony at 8.

sources that already have installed "reasonably available control technology" (RACT) under current law. These sources would be required to achieve additional VOC emission reductions to meet the bill's much more stringent definition of RACT, which arguably makes it the practical equivalent of the "lowest achievable emission rate" (LAER) controls required today for new sources. What is more, the bill would extend this mandatory "super RACT" requirement to many sources not now covered -- including small sources -- by prohibiting emissions trading (netting) and substantially lowering (from 100 to 25) the tons-per-year emissions thresholds for coverage. The result would be to subject already tightly controlled larger sources, as well as currently uncontrolled smaller sources, to a sweeping retrofit program. Nowhere has it been shown what the emission reduction or air quality benefits of such a program might be, or why it is necessary to extend such controls to all covered sources in all post-1987 nonattainment areas.

This "super RACT" requirement would mean that sources already equipped with effective or even state-of-the-art controls would face a second, far more costly round of emission reduction requirements. Because those requirements may be the practical equivalent of the LAER requirements imposed under current law on new sources, many existing facilities (and especially older facilities) might have to be wholly or partially rebuilt in order to comply, a prospect that surely will be unaffordable in many instances. What is more, the bill's ban on the cost-effective bubbling and emission trading provisions authorized under current law will shut down even more facilities, because the inability to meet "super RACT" at even one unit or operation would often mean (i) production curtailments, (ii) facility closures, or (iii) the relocation of the operations (and jobs) to attainment areas or even outside the U.S.

Small businesses, hit for the first time by such crushing retrofit or rebuilding requirements, will close down in even greater numbers. And because the bill's "super RACT" requirements and bans on bubbling and trading would apply in all post-1987 nonattainment areas, these effects would be widespread across the country. An untold number of workers could be laid off.

b. Inspection and maintenance programs

Additionally, the bill contemplates the widespread utilization of "enhanced" I/M programs in post-1987 nonattainment areas. To be sure, in many areas these programs would improve the effectiveness of existing I/M programs, both because the idle test used in current programs often fails to identify vehicles that are exceeding the standards in-use, and because the bill's requirement for direct inspection of emission control systems will help lower emissions by reducing undetected and uncorrected tampering. Nevertheless, as EPA has stressed, "strict I/M programs" are not always "reasonable" attainment measures, because "[i]t does not make sense to force [some] areas to undergo the lengthy and difficult process of instituting an I/M program when they will probably reach attainment before the program is in place, or shortly thereafter."29/

c. Stage II gas refueling nozzles

EPA Administrator Lee Thomas, in his testimony before this Committee, had many criticisms of the Committee bill. But one of his most indisputable arguments was on the duplicative overcontrol imposed by the overlapping Stage II vapor recovery and onboard canister provisions in the bill. His written statement to the Committee reads:

29/ Thomas testimony at 17 (emphasis supplied).

> Title I would mandate that the State Implementation Plans in most ozone nonattainment areas require Stage II technology on gasoline pumps in order to control basically the same refueling vapors captured by the onboard control required on new cars by Title III. Over the long term, this technological redundancy would lead to very high marginal costs and very little marginal control.30/

Figure #4, used to illustrate the Administrator's point, shows that, by 1996, onboard canisters will be controlling the same and more hydrocarbon emissions as the Stage II recovery systems mandated by the Committee bill -- assuming current enforcement.

Stage II enforcement, however, is an even more difficult problem. For the awkward and cumbersome Stage II nozzle to work properly, it must be held to form a seal around the gas tank opening on the car. This is difficult for many people to do, and, in fact, many don't. Stage II efficiency, as measured in the real world, is extremely low. New York State, as a matter of fact, has not, with existing monitors, measured any ozone level reductions attributable to Stage II.31/

Even in the face of clear evidence that the Stage II requirement is inefficient and duplicative, it may be asserted that some duplication is necessary so as to control refueling emissions sooner. Considerable evidence, however, discredits even that argument.

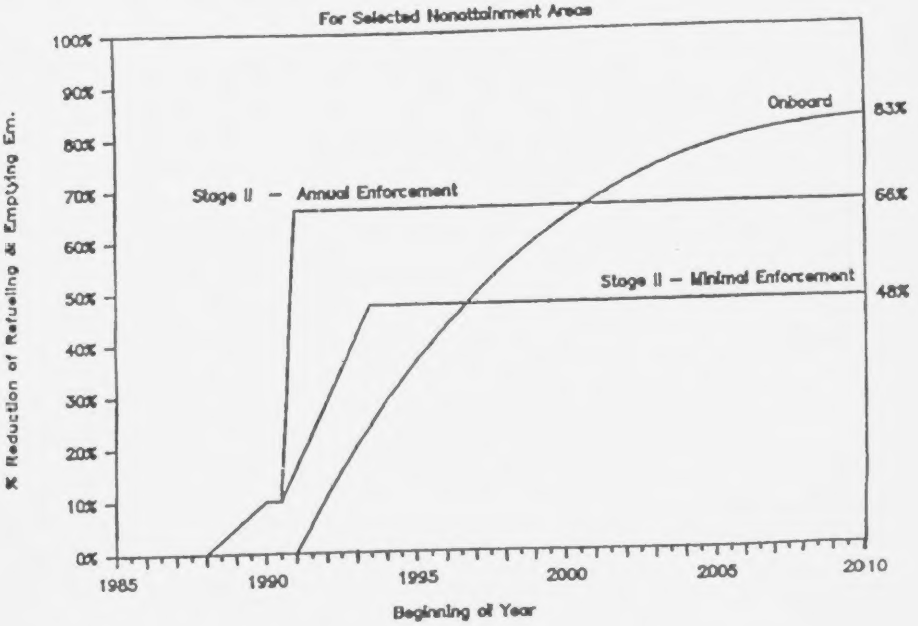
30/ Thomas testimony at 19.

31/ Herman Bach, Northwestern Ohio Gasoline Dealers Association, September 22, 1987, letter to members of the Senate Environment and Public Works Committee ["NOGDA letter"].

Figure # 4: Overlap of Stage II and Onboard Vapor Controls

OVERLAP OF STAGE II AND ONBOARD

PERCENT VOC EMISSION REDUCTION



Assuming, as the Committee bill does, that onboard control systems can be in place by 1991, a Stage II requirement adopted in 1988 would provide merely three years of lead time for that type of control. According to the New York State Department of Environmental Conservation, however, "the estimate for fully implementing a Stage II program, in just the ozone nonattainment areas, is 5 - 6 years."32/ If that is true, then the Stage II program imposed by this bill could not be fully implemented until 3 to 4 years after onboard canister controls are already in place.

The Congressional Research Service estimates this provision could cost America's gas stations more than half-a-billion dollars.33/ According to Administrator Thomas, the capital investment required for Stage II is at least $12,000 per gas station. After that, an additional $2,500 per year is required for maintenance.34/ The Service Station Dealers of America, Inc. have estimated that these costs could force many service stations out of business, as many as 9% due to inability to finance the initial capital costs, and as many as 20% due to the annual maintenance costs.35/

32/ Harry H. Hovey, Jr., P.E., Director, Division of Air, New York State Department of Environmental Conservation, November 5, 1984, in comments submitted to the Environmental Protection Agency on "Regulation Strategies for the Gasoline Marketing System", Docket #A-94-07.

33/ *See* Table #1.

34/ Testimony of Lee M. Thomas, Administrator, Environmental Protection Agency, Before the Subcommittee on Health and the Environment, House Committee on Energy and Commerce, April 27, 1987.

35/ NOGDA letter at 1.

2. Widespread Social and Economic Disruptions

Although the impacts outlined above will be felt in many areas of the country, other provisions of the Committee bill will present specific communities with drastic and unprecedented new federal obligations that will prove to be unacceptable to the many citizens affected. It is true, of course, that in a few local areas of the country major efforts will be needed to reach attainment, particularly of the ozone standard. The Committee bill, however, would require much greater social costs than are necessary, including community disruptions and intrusive changes in lifestyle, mainly for two reasons:

- First, the bill virtually insists on attainment within 10 years in every area except that of Los Angeles, which has a 15 year deadline.36/
- Second, the bill arbitrarily extends the disruptive measures needed to reach attainment within 10 years to some areas that may not need them even for a 10 year deadline.37/

For example, the bill would impose automatic percentage emission reductions on "major" sources in these areas, which must be met regardless of technical feasibility or affordability. The bans on bubbling and emissions trading would mean that these reductions would apply to individual units and operations not currently regulated, and the lowered 25 TPY threshold for defining "major"

36/ Testimony of Samuel A. Leonard, Director of Emission Control Department, Environmental Activities Staff, General Motors Corporation, to the Subcommittee on Environmental Protection, Senate Committee on Environment and Public Works, April 9, 1987, p. 10.

37/ Post-1987 nonattainment areas with design values more than 50% above the standard are presumptively covered by the harshest new federalized implementation requirements the bill would enact.

sources would sweep in an untold number of small businesses. The sources affected by these provisions, including major employment centers like refineries, chemical plants, automobile assembly plants, and other major manufacturing facilities, may have no choice but to close down and relocate in attainment areas or even outside the U.S. Ironically, facilities that already have installed state-of-the-art emission controls would often be among the first to go, because further reductions would be unavailable in such cases and emissions trading would be banned.

Such a mass exodus would be accompanied and accelerated in most of these areas by "transportation control measures" designed to dramatically curtail automobile use. These measures would not only demand radical changes in the lifestyles and restrictions on the personal mobility of ordinary Americans, but also impose further crushing burdens on large and small businesses. For example, the bill could require states to adopt measures like the following (or alternative measures that lower emissions by a comparable amount):

* "Trip reduction ordinances," which likely could mean gas taxes, gas rationing, alternative driving days, or forced reductions in miles travelled per car or per person;

* "Vehicle restricted zones," which could cripple business activity in downtowns and other commercial areas;

* "Programs for improved public transit," which could mean multibillion dollar mass transit systems; and

* "Fleet conversion" to alternative fuels or engines, despite the substantial uncertainties about the emissions, energy supplies, costs, and infrstructure requirements for these vehicles.

We recognize, as described previously, that major emission reductions will be needed in a few "chronic" nonattainment areas that will not reach attainment in the next few years. The Committee bill, however, demands far too great a sacrifice from the citizens and businesses in these areas given a fair assessment of the nature and magnitude of the public health risk presented.

3. Onerous Sanctions

Section 104 of the Committee bill greatly enhances the use of "federal blackmail"-type sanctions as a way to force states and localities to accept the controls imposed under the amended Clean Air Act. Three of these "sanctions" are worth mentioning:

A constuction (and modification) moratorium is mandated for stationary sources in a nonattainment area if (i) the applicable attainment date has expired and the area remains nonattainment, or (ii) the state has not submitted a Phase I or Phase II SIP revision, or (iii) the state has failed to submit a SIP revision to conform to a new or revised primary air quality standard or a notice of SIP inadequacy, or (iv) the state has failed to implement Phase I or Phase II or federal hydrocarbon emission controls.

Highway funds are cutoff (except for specified kinds of projects) in any nonattainment area that remains nonattainment after the applicable attainment date or if the state has not submitted SIP revisions or implemented Phase I or Phase II or federal hydrocarbon emission controls.

Discharge is prohibited into any publicly owned treatment works (POTW) with a Section 402 Clean Water Act permit by any source not previously using the POTW in any nonattainment area if the state has not submitted a Phase II plan (if required) or if the state or responsible local government is not implementing the plan's provisions for percentage emission reductions, emission fees and penalties, or 2-for-1 emission offset.

The Committee bill does provide a six-month waiver of these sanctions for those areas that have made a good faith effort to implement their approved State Implementation Plan (SIP). The conditions of this waiver, however, require such stringent further controls as to be considered sanctions in and of themselves. The Minority agrees with the concerns voiced by Senator Breaux along these lines, that such sanctions are unduly harsh on areas that through no fault of their own have been unable to reach attainment.

The wisdom of mandating severe sanctions without the Administrator having any flexibility in the matter is highly questionable. Without this flexibility, sanctions prohibiting plant modification and sewer system hook-up could result in greater environmental damage than they supposedly would prevent.

The threat of nonattainment sanctions in 1988 under current Clean Air requirements is one of the main issues fueling discussion of the Committee bill. While legislation postponing current law sanctions would be useful, it is doubtful that the Committee bill provides any relief along these lines. Rather, as Administrator Thomas stated, "it offers the prospect of short-term relief from a limit on permitting major sources in exchange for much more severe economic and social effects and growth limits over the long term."38/

38/ Thomas testimony at 10.

II. ACID DEPOSITION

A. U.S. Progress Controlling Sulfur Dioxide

Title II of this bill is a supposed necessity for the country in order to control the sulfur dioxide emissions believed to be precursors to acid deposition. It will require the industries of this nation, primarily the electric utility industry, to reduce sulfur dioxide (SO_2) emissions by 12 million tons annually and oxides of nitrogen (NOx) by 4 million tons annually. The costs will be astronomical, the benefits uncertain, and the impact on our economy great.

Currently, this nation leads the world in emission controls of all types. We spend about $30 billion annually to protect air quality in this country. The results have been dramatic. While other countries promise reductions and annouce plans to meet goals, the U.S. has reduced SO_2 emissions over the past 12 years by almost 30 percent. This has occurred not during a time of reduced production, but at a time when coal usage has soared by 80 percent. As one Washington Post editorial stated:

> The concentrations of. . .sulfur dioxide, have fallen sharply since the 1970s, when Congress began to go after it. Simply to have held air pollution constant over the past 14 years would have been a great achievement, because electric power consumption has risen by a third in that time and the number of motor vehicles by nearly half.39/

And there is every reason to believe that these trends will continue.

39/ "Cleanup Costs and Benefits," Washington Post, July 20, 1987. See Excerpt 5.

Excerpt # 5: "Cleanup Costs and Benefits"

Cleanup Costs and Benefits

CONTROLLING POLLUTION is good for your health, but it's not inexpensive. Last year Americans spent about $77 billion for clean air, clean water and waste disposal. That's a substantial figure, roughly the same as the Defense Department's procurement budget. Or the total of all the doctors' bills that year. Perhaps the doctors' bills are a better comparison, for the driving purpose of the pollution regulations is to prevent illness.

Four-fifths of the cleanup money is spent not by the government but by private businesses and consumers to meet federal and state environmental regulations. That $77 billion includes the catalytic converters in new cars and the extra cost of the unleaded gasoline that they require. It includes municipal sewage plants and the scrubbers that take most of the worst pollutants out of power plants' smoke.

The outlay on pollution control, now approaching 2 percent of GNP, is large enough to affect the way the economy works. What does the country get for its money? The most demonstrable improvements have been in air quality. The concentrations of one particularly toxic pollutant, sulfur dioxide, have fallen sharply since the early 1970s, when Congress began to go after it. Simply to have held air pollution constant over the past 14 years would have been a great achievement, because electric power consumption has risen by a third in that time and the number of motor vehicles by nearly half.

Progress in improving water quality has been uneven, but there have been striking improvements in some areas. The Potomac River is one example of success.

The cost of pollution abatement and control rises steadily. The Commerce Department economists who track these figures estimate that since the early 1970s, total public and private spending on it has gone up an average of 3.5 percent a year after inflation. That's not beyond the country's capacity, but the amounts are large enough to require careful consideration of the way that the program is evolving.

Among many environmental dangers, where can the next billion dollars be spent most effectively? The country is, for example, spending too much on cleaning up toxic waste dumps and not enough on indoor pollution and the threat of radon gas. Environmental policy is now running mostly on past momentum. The country is doing a very respectable job with the pollutants that it identified in the past decade, but there's no clear sense of future direction guiding this gigantic partnership of public and private spending.

Taken from The Washington Post, July 20, 1987

In testimony before the Environmental Protection Subcommittee, EPA Administrator Thomas demonstrated with measurable data that air quality has improved dramatically over the past decade and a half. He documented the reduced emissions and presented information on the huge expenditures that have been, are being, and will continue to be made. **His presentation made a convincing argument that the present Clean Air Act is working, and working well, to protect the health and welfare of Americans.**

The Administrator also asserted that he has ample authority to do whatever is necessary to continue the progress. He complained that scientific knowledge does not justify what is contemplated in Title II of this bill. He does not need, nor want, the additional authority or needless responsibilities that would be mandated by Title II.

B. Canadian Claims in Perspective

The extensive propaganda from Canada has misled citizens of this country into believing that Canada's air pollution control program is ahead of ours. Nothing could be further from the truth. On a per capita basis, Canada's sulfur dioxide emissions are nearly twice as high as ours. In fact, Eastern Canada's average SO_2 emission rate from thermal power plants is 40 percent higher than aggregate average U.S. emissions from that type of source.

There are 142 operating SO_2 scrubbers on U.S. power plants, and 49 more are under construction or planned. Canada has none in operation, and if any are under construction or planned, it is a well-kept secret.

Two recent reports compare the U.S. and Canadian programs. The first, by ICF, Inc., for the Environmental Protection Agency, is "Canada's Air Quality Program", September 1987. The second, "Comparison SO_2 Emissions study: U.S. and Canada," was prepared by

Envirosphere Company for Edison Electric Institute. Both come to remarkably similar conclusions and put many of the Canadian claims into proper perspective.

For example, ICF reported:

> Most of the decline in SO2 emissions that have occurred (in Canada) since 1979 were due to changes in production levels caused by poor market conditions and intermittent controls [which are illegal in the U.S.] that were required to meet ambient air quality standards.**40**/

The Envirosphere study found:

> In comparison to the United States, Canada has no history of stringent environmental regulations in SO2 emissions that have occurred at either Federal or Provincial levels. Much of the reductions in SO2 emissions that have occurred between 1974 and 1984 are primarily the result of socioeconomic factors such as strikes and production cutbacks within the non-ferrous smelting industry, which is the single largest emitter of SO2 in Canada.**41**/

For the past two years, Canada has been touting its intention to reduce SO_2 emissions 50 percent below 1980 levels by 1994. ICF reports that the official targets were calculated from allowable, rather than actual, 1980 emissions levels -- so even if the plan is carried out (and there is plenty of history to cause doubt about that), the reduction will be 35, not 50 percent.

40/ ICF Incorporated, Final Report: Canada's Air Quality Program, presented to the Office of Program Development, Air and Radiation, U.S. Environmental Protection Agency (Washington, D.C.: ICF Incorporated, 1987), p. E-9.

41/ Envirosphere Company, Comparison SO2 Emissions Study: U.S. and Canada, submitted to the Edison Electric Institute, (Washington, D.C.: Ebasco Services Incorporated, 1987), p. 2.

Other facts reported by ICF: The aggregate emission rate for New Brunswick Power's thermal generating stations was 135 percent higher in 1985 than in 1978, and Nova Scotia Power's increased by 22 percent over that period; Manitoba has left room for increased emissions from new sources, despite the announced cap on all sources for 1994 and thereafter, and its proposed acid rain regulations would allow SO_2 emission to increase 13.6 percent over 1980 actual emissions; New Brunswick and Nova Scotia have not yet signed agreements to reduce emissions; and 174,000 tonnes of the target reduction remain to be allocated.

Canada says its acid rain control program will cost utilities and industry $500 million annually, an estimate for which ICF could obtain no documentation. But even if true, compare $500 million to this country's $30 billion yearly expenditure -- 60 times as large -- to comply with our present Clean Air Act. And then remember that the provisions of the Committee bill would make that price tag look small by comparison.

What is the Canadian Environment Minister's reaction to these facts? Is he going to beef up the Canadian program? No, he plans a $850,000 propaganda program in the U.S. to have expensive central legislation passed here.

Even some environmental groups say the Canadian Environment Minister "talks a better game than he plays."[42] Canadian acid rain "accomplishments" appear always to be in the future tense and must be taken with a large grain of salt until there has been some concrete action.

Perhaps if Canada did less talking and took more control action we'd both be better off. Or maybe we should be just as aggressive

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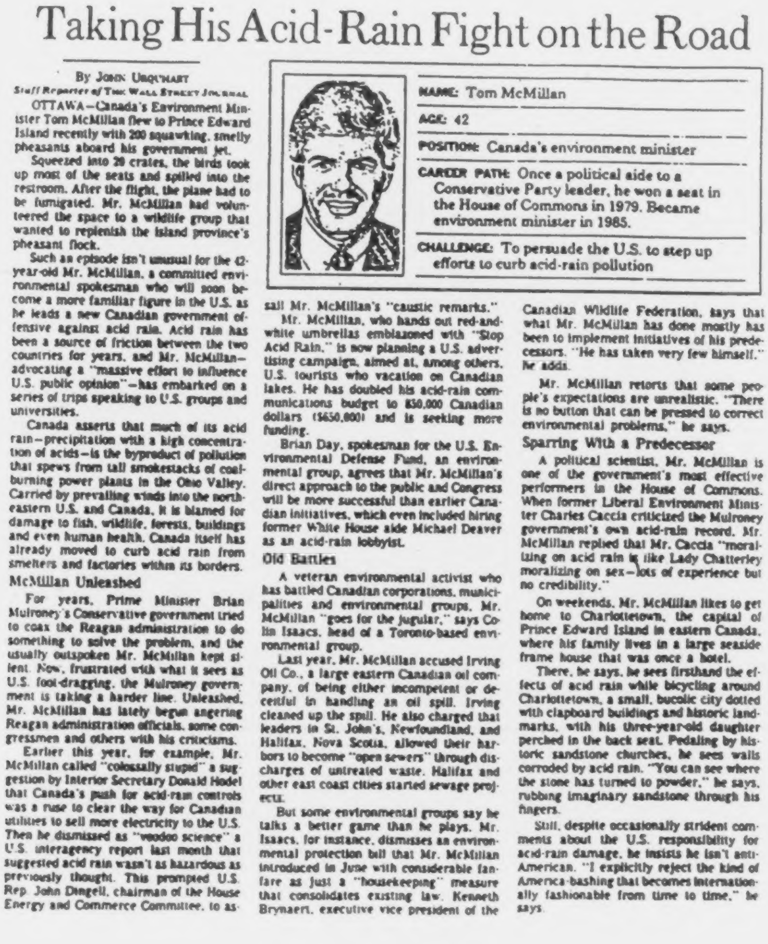
[42] Wall Street Journal, "Taking His Acid-Rain Fight on the Road", October 16, 1987. See Excerpt 6.

Excerpt # 6: "Taking His Acid-Rain Fight on the Road"



Taking His Acid-Rain Fight on the Road

By John Urquhart

Staff Reporter of The Wall Street Journal

NAME: Tom McMillan

AGE: 42

POSITION: Canada's environment minister

CAREER PATH: Once a political aide to a Conservative Party leader, he won a seat in the House of Commons in 1979. Became environment minister in 1985.

CHALLENGE: To persuade the U.S. to step up efforts to curb acid-rain pollution

OTTAWA—Canada's Environment Minister Tom McMillan flew to Prince Edward Island recently with 200 squawking, smelly pheasants aboard his government jet.

Squeezed into 20 crates, the birds took up most of the seats and spilled into the restroom. After the flight, the plane had to be fumigated. Mr. McMillan had volunteered the space to a wildlife group that wanted to replenish the island province's pheasant flock.

Such an episode isn't unusual for the 42-year-old Mr. McMillan, a committed environmental spokesman who will soon become a more familiar figure in the U.S. as he leads a new Canadian government offensive against acid rain. Acid rain has been a source of friction between the two countries for years, and Mr. McMillan—advocating a "massive effort to influence U.S. public opinion"—has embarked on a series of trips speaking to U.S. groups and universities.

Canada asserts that much of its acid rain—precipitation with a high concentration of acids—is the byproduct of pollution that spews from tall smokestacks of coal-burning power plants in the Ohio Valley. Carried by prevailing winds into the northeastern U.S. and Canada, it is blamed for damage to fish, wildlife, forests, buildings and even human health. Canada itself has already moved to curb acid rain from smelters and factories within its borders.

McMillan Unleashed

For years, Prime Minister Brian Mulroney's Conservative government tried to coax the Reagan administration to do something to solve the problem, and the usually outspoken Mr. McMillan kept silent. Now, frustrated with what it sees as U.S. foot-dragging, the Mulroney government is taking a harder line. Unleashed, Mr. McMillan has lately begun angering Reagan administration officials, some congressmen and others with his criticisms.

Earlier this year, for example, Mr. McMillan called "colossally stupid" a suggestion by Interior Secretary Donald Hodel that Canada's push for acid-rain controls was a ruse to clear the way for Canadian utilities to sell more electricity to the U.S. Then he dismissed as "voodoo science" a U.S. interagency report last month that suggested acid rain wasn't as hazardous as previously thought. This prompted U.S. Rep. John Dingell, chairman of the House Energy and Commerce Committee, to assail Mr. McMillan's "caustic remarks."

Mr. McMillan, who hands out red-and-white umbrellas emblazoned with "Stop Acid Rain," is now planning a U.S. advertising campaign, aimed at, among others, U.S. tourists who vacation on Canadian lakes. He has doubled his acid-rain communications budget to $850,000 Canadian dollars ($650,000) and is seeking more funding.

Brian Day, spokesman for the U.S. Environmental Defense Fund, an environmental group, agrees that Mr. McMillan's direct approach to the public and Congress will be more successful than earlier Canadian initiatives, which even included hiring former White House aide Michael Deaver as an acid-rain lobbyist.

Old Battles

A veteran environmental activist who has battled Canadian corporations, municipalities and environmental groups, Mr. McMillan "goes for the jugular," says Colin Isaacs, head of a Toronto-based environmental group.

Last year, Mr. McMillan accused Irving Oil Co., a large eastern Canadian oil company, of being either incompetent or deceitful in handling an oil spill. Irving cleaned up the spill. He also charged that leaders in St. John's, Newfoundland, and Halifax, Nova Scotia, allowed their harbors to become "open sewers" through discharges of untreated waste. Halifax and other east coast cities started sewage projects.

But some environmental groups say he talks a better game than he plays. Mr. Isaacs, for instance, dismisses an environmental protection bill that Mr. McMillan introduced in June with considerable fanfare as just a "housekeeping" measure that consolidates existing law. Kenneth Brynaert, executive vice president of the Canadian Wildlife Federation, says that what Mr. McMillan has done mostly has been to implement initiatives of his predecessors. "He has taken very few himself," he adds.

Mr. McMillan retorts that some people's expectations are unrealistic. "There is no button that can be pressed to correct environmental problems," he says.

Sparring With a Predecessor

A political scientist, Mr. McMillan is one of the government's most effective performers in the House of Commons. When former Liberal Environment Minister Charles Caccia criticized the Mulroney government's own acid-rain record, Mr. McMillan replied that Mr. Caccia "moralizing on acid rain is like Lady Chatterley moralizing on sex—lots of experience but no credibility."

On weekends, Mr. McMillan likes to get home to Charlottetown, the capital of Prince Edward Island in eastern Canada, where his family lives in a large seaside frame house that was once a hotel.

There, he says, he sees firsthand the effects of acid rain while bicycling around Charlottetown, a small, bucolic city dotted with clapboard buildings and historic landmarks, with his three-year-old daughter perched in the back seat. Pedaling by historic sandstone churches, he sees walls corroded by acid rain. "You can see where the stone has turned to powder," he says, rubbing imaginary sandstone through his fingers.

Still, despite occasionally strident comments about the U.S. responsibility for acid-rain damage, he insists he isn't anti-American. "I explicitly reject the kind of America-bashing that becomes internationally fashionable from time to time," he says.

Taken from The Wall Street Journal, October 16, 1987 telling the world what we have been, and are, doing to control emissions in the United States. At any rate, it's time to tell Canada to "cut the Yankee-bashing" and get on with controlling their own pollution. Members of the U.S. Congress should take pride in this country's clean air accomplishments -- and stop proposing costly legislation to solve a propagandized "acid rain" problem.

C. **Benefits of a Major New Program Uncertain**

In his testimony, Administrator Thomas said of the acid deposition provisions of this bill:

> [T]his bill not only presupposes that today's scientific knowledge justifies an acid rain control program, but that it justifies a very large control program to be implemented over a very short time. . . .I think this proposed program is premature at best, and I cannot support it.[43]

In 1980, our distinguished colleague from New York, Senator Daniel Patrick Moynihan, showed perception and responsibility when he authored Title VII of the Energy Security Act, P.L. 96-294. Congress passed that law and thereby established the National Acid Precipitation Assessment Program (NAPAP). Commendable progress has been made under this program, which involved 12 federal agencies, to study the causes and effects of acid rain. We know a lot more now than we did a few years ago and we will learn even more as the study is completed over the next 3-4 years.

In mid-September of this year, the interim NAPAP assessment was released and, although knowledge is by no means complete, it was concluded that any problem is considerably less severe than many of us had been led to believe.

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[43] Thomas testimony at 14.

It is regrettable that the Committee on Environment and Public Works did not closely examine and carefully consider the NAPAP interim findings before reporting the Committee bill. If it had, Committee members would realize there is no environmental crisis from acid rain, and they would not be proposing drastic additional control measures that will cost our citizens higher electric bills, jobs, and further reduce our industries' competitiveness.

NAPAP's findings, as described in Excerpt #7, clearly illustrate that acid rain poses no environmental crisis, that claims of adverse effects are exaggerated or wrong, that air quality has improved and will continue to get better, and that the expenditure of billions of wasted dollars has been prevented. As the Wall Street Journal stated in its editorial on September 23, 1987:

> The lesson of the acid-rain experience. . .is that environmentalism has passed the stage when the mere assertion of a problem can elicit a rush to regulation and financial commitments from elected officials. In the future, environmentalists will have to prove their claims before the public signs on to multi-billion-dollar fixes. Clearly, the environmentalists' claims have not been proved.[44]

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[44] "The $94 Billion Report", The Wall Street Journal, September 23, 1987. See Excerpt 8.

Excerpt # 7: Inside EPA Summary of Interim NAPAP Report

NAPAP SAYS UNCERTAINTIES IN ACID RAIN DATA PRECLUDE CONTROL DECISION

An interim assessment by the National Acid Precipitation Assessment Program (NAPAP) concludes that scientific uncertainties preclude regulatory decisionmaking on acid rain, though NAPAP expects to resolve many issues by 1990. The report is the second major document by NAPAP, authorized by Congress to undertake a ten-year study on the adverse effects of acid rain. The report's main conclusion could become ammunition for both sides of the acid rain debate, sources say — both as a basis for postponing regulatory action because of a lack of evidence and for swiftly implementing controls because such evidence will never be sufficiently documented.

Canadian environmentalists reportedly are outraged at the report's findings, and plan to launch an extensive campaign for sulfur dioxide reduction in the U.S.

The five-year interim assessment presents the "state of the science" on acid rain and focuses on the reduction of scientific uncertainties resolved by the research to date. The report states that "Preliminary evaluation of possible economic impacts of acidic deposition has been attempted, but the lack of quantifiable effects constrains the assessment." NAPAP continues that "many facets of the acid rain problem remain to be explored," and asserts that only the "major" uncertainties will be addressed in NAPAP's remaining years. But NAPAP believes that it can provide a sound basis for decisionmaking on acid rain by addressing such uncertainties.

The report says it will contribute to knowledge on: quantities of man-made emissions of acid rain precursors; status of technology for reducing emissions; effect of acid rain on crops; and patterns of wet deposition in the U.S. Uncertainties to be reduced by 1990 include: sources, quantities, and reactivities of sulfur dioxide, nitrogen oxide, volatile organic compounds, methane and alkaline substances; the origin of hydrogen peroxide; influence of urban emissions on local deposition; forest soil types sensitive to change by acid rain; the effect of acid rain on aquatic life; and the damage to galvanized steel and carbonate stone from SO_2. The effect of wet and dry acidity on painted surfaces; human health effects from acidic aerosols; and contributions of individual sources of emissions to deposition as specific receptors; will likely remain unresolved, NAPAP says.

Findings in the interim report include:

Effects of acid rain on crops, aquatic systems and forests. NAPAP foresees no significant change in these resources at present air pollution levels, and concludes that watersheds both in the Northeast and the Upper Middle West will likely remain at current levels. The report continues: "Further significant surface water acidification is unlikely to occur rapidly at current deposition levels." Short-term "foliar" effects on crops or healthy forests also are unlikely.

Relationship: SO_2 and acid rain. The report found that SO_2 reductions are unlikely to result in a decrease in acid rain in the northeastern U.S. Though the report concludes that cuts in SO_2 emissions may reduce dry and wet deposition of SO_2 compounds, the magnitude and extent of the reduction are uncertain.

Economic impacts. Acid rain has no effect on crops, but may benefit soil by acting as fertilizer, through nitrogen, a plus assessed at $100-million a year. NAPAP says that though little is known about the effects of acid rain on vegetation, ozone presents adverse effects, a loss estimated at a billion dollars per year. But NAPAP said "There is insufficient information for an analysis of the economic impacts of acidic deposition, ozone, and associated pollutants on forests at this time."

Clean coal. The Energy Dept 's clean coal program will spur implementation of new technology, and may result in a significant decline in SO_2 and NO_x emissions at much lower cost. NAPAP reports other promising technologies: the catalytic converter for VOCs, and the flue gas desulfurization for SO_2 control.

SO_2 trends. SO_2 reductions have decreased 27%, 8-million tons/year, between 1973 and 1985, a trend which has continued into the 1980s, NAPAP reports.

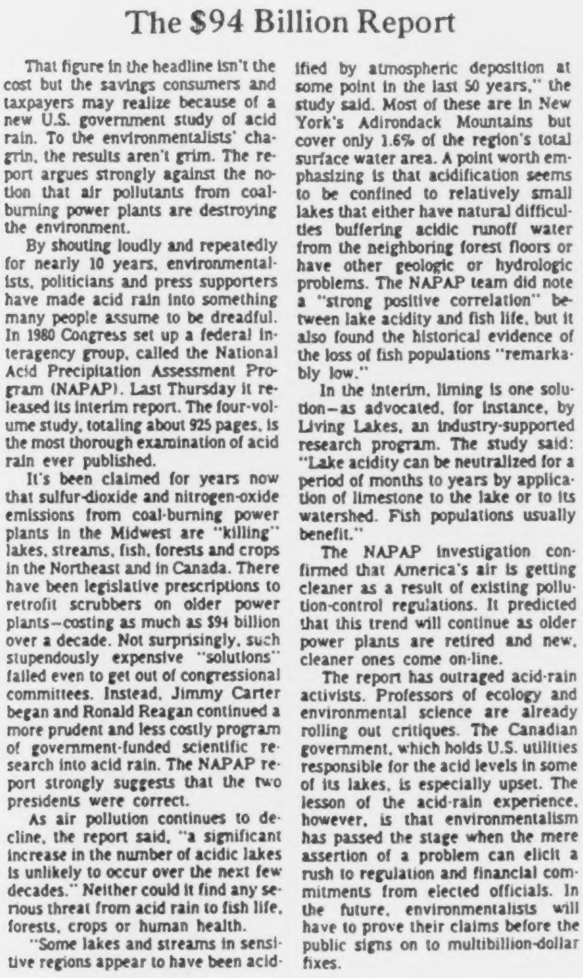
NO_x, VOC trends. NO_x emissions increased during the 1950s and 1960s until 1973, when emissions reached a plateau of around 20-million metric tons/year. VOCs have declined to 20 million metric tons in 1985, from a peak in 1970.

Emissions to Canada. SO_2 emissions from power plants in the eastern states bordering Canada were reduced by about 20% between 1975 and 1985. The greatest reductions were achieved in Michigan, where SO_2 was reduced from 1.2-million metric tons/year in 1975 to about 0.6-million in 1986.

NAPAP states that a rational control strategy should be based on a careful assessment of acid rain's precursors and a determination of which cause damage. NAPAP states that since some geographical areas may not be sensitive to acid rain effects, "an economic strategy of control must be built on a careful quantification of the sum of all effects, taking such factors into account."

Taken from Inside EPA, September 18, 1987

Excerpt # 8: "The $94 Billion Report"



The $94 Billion Report

That figure in the headline isn't the cost but the savings consumers and taxpayers may realize because of a new U.S. government study of acid rain. To the environmentalists' chagrin, the results aren't grim. The report argues strongly against the notion that air pollutants from coal-burning power plants are destroying the environment.

By shouting loudly and repeatedly for nearly 10 years, environmentalists, politicians and press supporters have made acid rain into something many people assume to be dreadful. In 1980 Congress set up a federal interagency group, called the National Acid Precipitation Assessment Program (NAPAP). Last Thursday it released its interim report. The four-volume study, totaling about 925 pages, is the most thorough examination of acid rain ever published.

It's been claimed for years now that sulfur-dioxide and nitrogen-oxide emissions from coal-burning power plants in the Midwest are "killing" lakes, streams, fish, forests and crops in the Northeast and in Canada. There have been legislative prescriptions to retrofit scrubbers on older power plants—costing as much as $94 billion over a decade. Not surprisingly, such stupendously expensive "solutions" failed even to get out of congressional committees. Instead, Jimmy Carter began and Ronald Reagan continued a more prudent and less costly program of government-funded scientific research into acid rain. The NAPAP report strongly suggests that the two presidents were correct.

As air pollution continues to decline, the report said, "a significant increase in the number of acidic lakes is unlikely to occur over the next few decades." Neither could it find any serious threat from acid rain to fish life, forests, crops or human health.

"Some lakes and streams in sensitive regions appear to have been acidified by atmospheric deposition at some point in the last 50 years," the study said. Most of these are in New York's Adirondack Mountains but cover only 1.6% of the region's total surface water area. A point worth emphasizing is that acidification seems to be confined to relatively small lakes that either have natural difficulties buffering acidic runoff water from the neighboring forest floors or have other geologic or hydrologic problems. The NAPAP team did note a "strong positive correlation" between lake acidity and fish life, but it also found the historical evidence of the loss of fish populations "remarkably low."

In the interim, liming is one solution—as advocated, for instance, by Living Lakes, an industry-supported research program. The study said: "Lake acidity can be neutralized for a period of months to years by application of limestone to the lake or to its watershed. Fish populations usually benefit."

The NAPAP investigation confirmed that America's air is getting cleaner as a result of existing pollution-control regulations. It predicted that this trend will continue as older power plants are retired and new, cleaner ones come on-line.

The report has outraged acid-rain activists. Professors of ecology and environmental science are already rolling out critiques. The Canadian government, which holds U.S. utilities responsible for the acid levels in some of its lakes, is especially upset. The lesson of the acid-rain experience, however, is that environmentalism has passed the stage when the mere assertion of a problem can elicit a rush to regulation and financial commitments from elected officials. In the future, environmentalists will have to prove their claims before the public signs on to multibillion-dollar fixes.

Taken from The Wall Street Journal, September 23, 1987

Nor has science been able to verify the acid rain crisis to which Canadian politicians point accusing fingers. A recent study entitled Effects of Acidic Deposition on Canadian Ecosystem: A Review,45/ calls into question some of the here-to-for unchallenged allegations of Canadian politicians. The review, conducted by a group of five recognized air and environmental science experts, summarizes the key conclusions in the six volume report of the Canadian Research and Monitoring Coordinating Committee (RMCC) released in August 1986, and evaluates the scientific basis for these conclusions.

The report determined that, in many cases, the conclusions presented in the Canadian assessment documents are not supported by a careful review of the available data. The report notes that while the scientific data itself is typically of high quality, "the conclusions presented in Canadian assessment documents ignore major uncertainties in our understanding and quantification of the effects from acidic deposition."46/ The critique further described the Canadian's assertions, as presented in the Executive Summary of the RMCC (1986), as "not an accurate reflection of the more detailed scientific discussions in the body of the text nor of the scientific literature in general."47/

45/ Joan P. Baker, et al., Effects of Acidic Deposition on Canadian Ecosystems: A Review, (October 22, 1987)

46/ Id. at 66.

47/ Id. at 62.

Excerpt # 9: Evaluation of Canadian Conclusions

SYNOPSIS: EVALUATION OF CANADIAN CONCLUSIONS ON ACIDIC DEPOSITION

CANADIAN CONCLUSION	AUTHORS' EVALUATION
Evidence for Acidification	
"The MOI conclusion that there has been an increase in sulphur and acidity in surface waters in eastern Canada over the past several decades has been confirmed by recent indirect evidence from sediment core analyses for sulphur, trace metals, and diatom fossils." (RMCC 1986; p. 1-9)	Increases in sulfur flux and acidity in surface waters in Canada over the past several decades have been confirmed only for waters impacted by large local sources of SO_2 (e.g., smelters at Sudbury and Wawa, Ontario). The evidence for trends for rivers in Nova Scotia and Newfoundland is uncertain largely as a result of problems with analytical techniques. Small decreases in alkalinity (10-30 µeq/L) have been reported for two lakes in southern Ontario, although the magnitude of these decreases are not much greater than reported errors in the measurement of alkalinity. Therefore, the Canadian conclusion that evidence exists for widespread acidification of surface waters across eastern Canada is not supported by the available data
Regional Estimates of Effects	
"Estimates...indicate that approximately 14,000 Canadian lakes are currently acidified. The model predicts that if present levels of wet deposition in the heavily impacted (greater than 20 kg/ha/yr of wet sulphate) region east of the Manitoba/Ontario border are maintained, a further 10,000 to 40,000 additional lakes will be acidified." (RMCC 1986; p. 1-12)	Published estimates of the numbers of acidified lakes and numbers of lakes expected to be acidified in the future are unreliable, and likely overestimate effects from acidic deposition. Uncertainties and errors in these estimates result from (1) assuming that all waters now acidic have been acidified within the past 60-100 years by acidic deposition, (2) the absence of regionally representative surveys for estimating the current status of surface waters in eastern Canada, (3) application of models of surface water acidification that have not been adequately tested, and (4) assuming little to no increase in base cation leaching with increases in strong acid input
Loss of Fish Populations	
"Fish population losses have been documented in the Sudbury area of Ontario and losses and declines have been confirmed in lakes more distant from Sudbury or other strong sulphur emission sources." (RMCC 1986; p. 1-10) " . [H]istorical data at Joe Lake near Sudbury spans a complete cycle of fish extinction from acidification in the 1950's to nearly full recovery by 1984 following stocking in 1977." (Bilateral Advisory and Consultative Group [BACG] 1987, p. 2)	The evidence for fishery declines, and subsequent recovery, in waters impacted by large, local sources of SO_2 from smelters, such as near Sudbury, Ontario, is irrefutable. Recent declines (since the mid-1950's) in Atlantic salmon catch in acidic Nova Scotia rivers have also been well documented, although causes of these declines remain uncertain. Outside of these two areas, there is little, if any, evidence for regional fishery declines associated with acidic deposition and surface water acidification.
Evidence for Groundwater Acidification	
"For the first time in Canada, there is evidence of short term acidification of shallow groundwater." (RMCC 1986; p. 1-9) "Recent measurements of shallow groundwater (less than one meter) have shown acidification by mineral acids." (BACG 1987; p. NF-14)	Short-term fluctuations in the pH and alkalinity of shallow groundwater during snowmelt have been documented at the Turkey Lakes watershed. These shifts in pH and alkalinity, however, occur independently of shifts in SO_4, or SO_4 plus NO_3, and instead are best correlated with shifts in the partial pressure of carbon dioxide. Thus, it cannot be concluded that changes in pH and alkalinity result from mineral acids or from acidic deposition. Adequate data to assess long-term trends in groundwater acidity are lacking.

SYNOPSIS: EVALUATION OF CANADIAN CONCLUSIONS ON ACIDIC DEPOSITION (continued)

CANADIAN CONCLUSION	AUTHORS' EVALUATION
Causes of Acidification -- Spatial Patterns	
"Across eastern Canada, the annual deposition of sulphate is highly correlated with the surface water alkalinity deficit." (RMCC 1986, p. 1-9)	On a regional scale across eastern Canada, high levels of SO_4 in surface waters are generally associated with high levels of atmospheric SO_4 deposition. In some areas, atmospheric SO_4 inputs are also associated with general indices of acidity status, such as the alkalinity deficit index. However, sulfur-bearing minerals are common (in some cases abundant) and affect the atmospheric-lake relationship for SO_4. Many sources (and sinks) of SO_4 and acidity (e.g., organic acids) play important roles in determining the acid-base status of surface waters. These processes and the mineral distributions of sulfur must be better understood before regional correlations among variables can be confidently interpreted as a causal relationship.
Causes of Acidification - Temporal Trends	
"Recent studies show that there has been a decrease in sulphur flux through some aquatic systems since the mid-1970's. In two regions, for which significant records are available (Nova Scotia and the Sudbury area of Ontario), decreases in sulphur fluxes have been associated with increases in alkalinity and pH. The decrease in sulphur flux in Nova Scotia is associated with a general reduction in total SO_2 emissions in North America, while the decrease at the Sudbury site is principally a result of a local control program. Findings from both sites support the decision to undertake a sulphur dioxide emission control program in eastern Canada." (RMCC 1986. p. 1-9)	Major reductions in SO_2 emissions from the Sudbury smelter have resulted in significant reductions in SO_4 and increases in pH and alkalinity in nearby surface waters. Atmospheric loadings near Sudbury in the past were extreme (> 100 kg SO_4/ha/yr total sulfur deposition). It cannot be assumed that responses to decreases in atmospheric SO_4 inputs observed in Sudbury lakes can be directly extrapolated for prediction of responses in other regions where deposition rates are typically at or below current levels of SO_4 deposition near Sudbury (20-50 kg SO_4/ha/yr). In Nova Scotia, apparent trends in surface water SO_4 probably result from changes in analytical methodology. Statistical analyses of the data do not support the claim that SO_4 levels in Nova Scotia rivers have declined since the mid-1970's. Results for pH are also uncertain. Trend analyses for alkalinity in these rivers have not been published. Thus, region-wide reductions in SO_4 flux in surface waters or improvements in water quality in eastern Canada, remote from smelters and other major local sources of SO_2, have not been established. Therefore, the effectiveness of changes in regional emissions cannot be determined based on the available data.
Organic Acids	
"Several studies in Canada and the U.S. have shown that natural organic acids cannot account for the acidic status of these lakes." (BACC 1987; p. 2) "Organic acids have often been proposed as the cause of surface water acidification rather than atmospheric deposition of acid sulphate and nitrate. This theory can be rejected on the basis of many studies.... Organic acids are not responsible for the loss of alkalinity." (Brydges 1986; p. 4)	Numerous processes contribute to surface water acidity. Organic acids and other natural acidification mechanisms are the primary cause of high acidity in some, although unknown, number of surface waters. Natural sources of acidity cannot be dismissed; these processes are ubiquitous, even in waters with low concentrations of dissolved organics. Rigorous and specific techniques to quantify these natural sources of acidity are needed

SYNOPSIS: EVALUATION OF CANADIAN CONCLUSIONS ON ACIDIC DEPOSITION (continued)

CANADIAN CONCLUSION	AUTHORS' EVALUATION
Rate of Response and Recovery	
"Where the availability of bedrock derived base cations is low (i.e., Canadian Shield), surface water responses to increasing acidic loadings are rapid (within a few months). In regions with higher base cation availability, the decline of surface water alkalinity is slower with delays in the order of months. There is limited information on the rate of response of both types of systems to decreasing acidic loadings, however studies to date indicate a fairly rapid reversal in acidification can be expected (years rather than decades)." (RMCC 1986, p. 1-11)	Rates of response to acidic deposition depend upon many factors, especially soil chemistry and basin hydrology, which are often not measured. Hence, recovery rates, in general, cannot be estimated with certainty. Reasons for the apparent rapid recovery of some lakes near Sudbury following decreases in smelter emissions need to be determined. Without this understanding, the degree to which responses observed at Sudbury can be extrapolated to other regions is not known.
Proposed Target Loadings	
"... for a maximum deposition of 20 kg/ha/yr of sulphate in wet deposition, nearly all surface waters would be protected from acidification damage." (Brydges 1986, p. 5) "Simulation model predictions indicate that a reduction of total sulphate deposition (wet plus dry) to 12 kg/ha/yr may be required to prevent damage to highly sensitive aquatic ecosystems and to protect moderately sensitive lakes and rivers from episodic acidification." (RMCC 1986, p. 1-12)	Existing estimates of target loadings for protection of surface waters all have significant uncertainties. The proposed target loading assumes an F factor of zero, i.e., no increase in base cation leaching. This assumption is not justified, even as a worst-case analysis, and overestimates the potential effects from acidic deposition.
Source/Receptor Relationship	
"Atmospheric model calculations predict that the current Canadian control objective of 2.3 million tonnes of SO_2 plus a 50% reduction in the U.S. would result in maximum deposition in the Muskoka and Quebec City areas in the range of 13-23 kg/ha/yr. Other Precambrian areas would have lower deposition ..." (Brydges 1986, p. 5) "It has been confirmed that, based on simple source-receptor relationships, approximately 50% of the sulphur deposited in eastern Canada has its origin in U.S. sources ... Over the past few years, simple linear transport models have been refined to the point that wet deposition of sulphur over a one year period is reasonably well simulated, indicating that the non-linear character of sulphur chemistry in the atmosphere is not critical in this application." (RMCC 1986, p. 1-8)	There is no reasonable scientific basis supporting the notion that simple atmospheric transport models may be used to develop SO_2 emission reduction strategies or to evaluate the effectiveness of those strategies. Their ability to perform this function remains to be evaluated and demonstrated.
Forest Effects	
"In recent years, there has been a marked decline in sugar maple in Quebec and Ontario in areas where there are high loadings of atmospheric pollutants ... [A]cid rain has been implicated as a contributing factor to this decline in certain locations." (RMCC 1986, p. 1-13)	There is no reasonable scientific foundation suggesting that acidic deposition contributes to sugar maple declines in Ontario or Quebec

SYNOPSIS: EVALUATION OF CANADIAN CONCLUSIONS ON ACIDIC DEPOSITION (continued)

CANADIAN CONCLUSION	AUTHORS' EVALUATION
Liming	
"The lake and river liming experiences in Ontario and Nova Scotia have highlighted the problems of full scale liming operations as a means of rehabilitating and protecting aquatic ecosystems: 1) in highly metal contaminated systems, liming may not reduce metal concentrations to non-toxic levels, 2) without concomitant reductions in deposition, liming is a continuous process, 3) liming may not protect the habitat for critical developmental periods of all fish species, i.e., during episodic events, 4) the long-term response of resident fish populations to liming has not yet been assessed, 5) on strictly economic terms, full scale liming of Nova Scotia Atlantic salmon rivers cannot be justified, 6) as liming is not an exact reversal of the acidification process and has been studied in a limited number of systems, the response of the resident community cannot be predicted. In Europe liming has occasionally led to domination by non-target or non-desirable species of fish." (RMCC 1986: p. 1-11)	Both experimental and operational liming programs in North America and Scandinavia have clearly demonstrated that liming-related improvements in water quality result in positive ecological responses. By careful selection of sites, application materials, and techniques, protection of critical habitats can generally be achieved and the need for frequent reapplication or continuous dosing minimized. Liming has its limitations, but must be considered a valuable management tool.

D. The Tremendous Cost of Unnecessary Controls

It is interesting to notice how the national press, the same press that has given so much play to Canadian acid rain propaganda in the past, is now tempering their views with economic reality. Even the Washington Post has endorsed balancing Clean Air legislation with cost consideration. In an editorial on March 22, 1987, the Post asked: "With the cost of controlling air pollution already over $30 billion a year, how much more should the country spend on it -- and is acid rain necessarily the top priority?"48/ Again, in a July 20, 1987 editorial, the Post notes that "Last year Americans spent about $77 billion for clean air, clean water and waste disposal. . .The outlay for pollution control, now approaching 2 percent of GNP, is large enough to effect the way the economy works."49/

The economic and employment impacts of Title II are devastating. Obviously, electric utility rates would be increased significantly. The EPA's study shows a cost of $6-8 billion annually would be incurred to comply with emissions reductions mandated by this Title.50/ But what about other industries, jobs, and the overall economy?

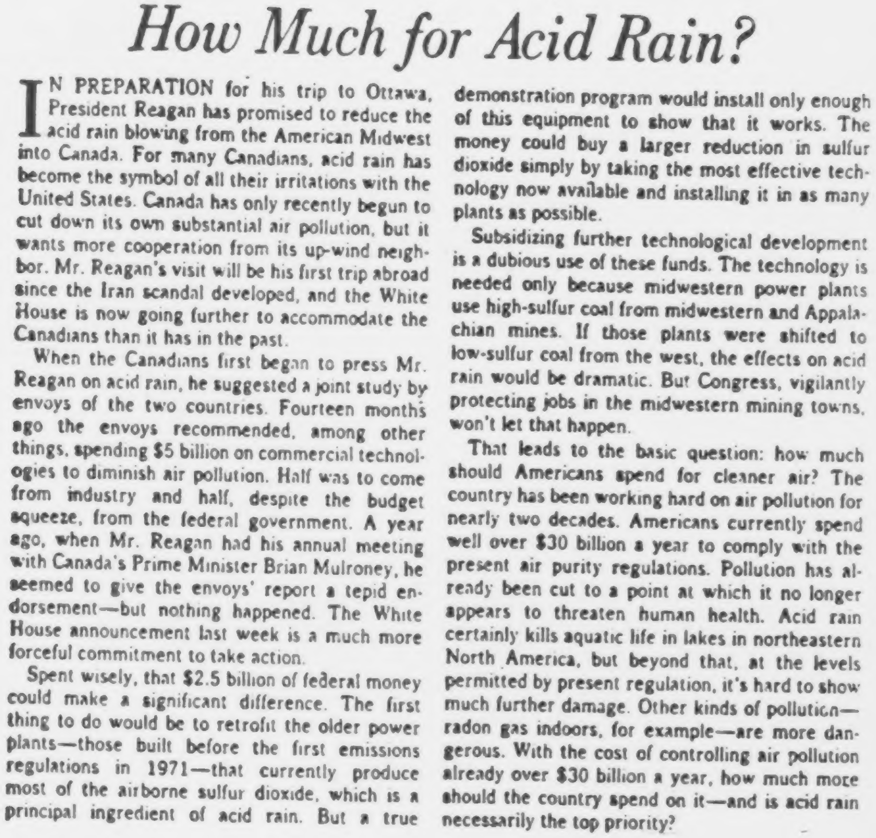
The National Association of Manufacturers (NAM), in September, released a report with startling and sobering conclusions which the members of this body should consider carefully before full Senate deliberation of the Committee-passed bill.

48/ The Washington Post, "How Much for Acid Rain?", March 22, 1987. See Excerpt 10.

49/ The Washington Post, "Cleanup Costs and Benefits", July 20, 1987. See Excerpt 5.

50/ The EPA study is further supported by CBO estimates of $6.2 - 10.6 billion and CRS estimates of $6 - 9 billion. See Table #1.

Excerpt #10: "How Much for Acid Rain?"



How Much for Acid Rain?

IN PREPARATION for his trip to Ottawa, President Reagan has promised to reduce the acid rain blowing from the American Midwest into Canada. For many Canadians, acid rain has become the symbol of all their irritations with the United States. Canada has only recently begun to cut down its own substantial air pollution, but it wants more cooperation from its up-wind neighbor. Mr. Reagan's visit will be his first trip abroad since the Iran scandal developed, and the White House is now going further to accommodate the Canadians than it has in the past.

When the Canadians first began to press Mr. Reagan on acid rain, he suggested a joint study by envoys of the two countries. Fourteen months ago the envoys recommended, among other things, spending $5 billion on commercial technologies to diminish air pollution. Half was to come from industry and half, despite the budget squeeze, from the federal government. A year ago, when Mr. Reagan had his annual meeting with Canada's Prime Minister Brian Mulroney, he seemed to give the envoys' report a tepid endorsement—but nothing happened. The White House announcement last week is a much more forceful commitment to take action.

Spent wisely, that $2.5 billion of federal money could make a significant difference. The first thing to do would be to retrofit the older power plants—those built before the first emissions regulations in 1971—that currently produce most of the airborne sulfur dioxide, which is a principal ingredient of acid rain. But a true demonstration program would install only enough of this equipment to show that it works. The money could buy a larger reduction in sulfur dioxide simply by taking the most effective technology now available and installing it in as many plants as possible.

Subsidizing further technological development is a dubious use of these funds. The technology is needed only because midwestern power plants use high-sulfur coal from midwestern and Appalachian mines. If those plants were shifted to low-sulfur coal from the west, the effects on acid rain would be dramatic. But Congress, vigilantly protecting jobs in the midwestern mining towns, won't let that happen.

That leads to the basic question: how much should Americans spend for cleaner air? The country has been working hard on air pollution for nearly two decades. Americans currently spend well over $30 billion a year to comply with the present air purity regulations. Pollution has already been cut to a point at which it no longer appears to threaten human health. Acid rain certainly kills aquatic life in lakes in northeastern North America, but beyond that, at the levels permitted by present regulation, it's hard to show much further damage. Other kinds of pollution—radon gas indoors, for example—are more dangerous. With the cost of controlling air pollution already over $30 billion a year, how much more should the country spend on it—and is acid rain necessarily the top priority?

Taken from The Washington Post, March 22, 1987

Based on modeling work by the reputable and competent Data Resources, Inc., and using figures from various government studies on proposed acid rain control legislation, NAM reported that measures similar to the touted "acid rain controls" in Title II of the Committee bill could:

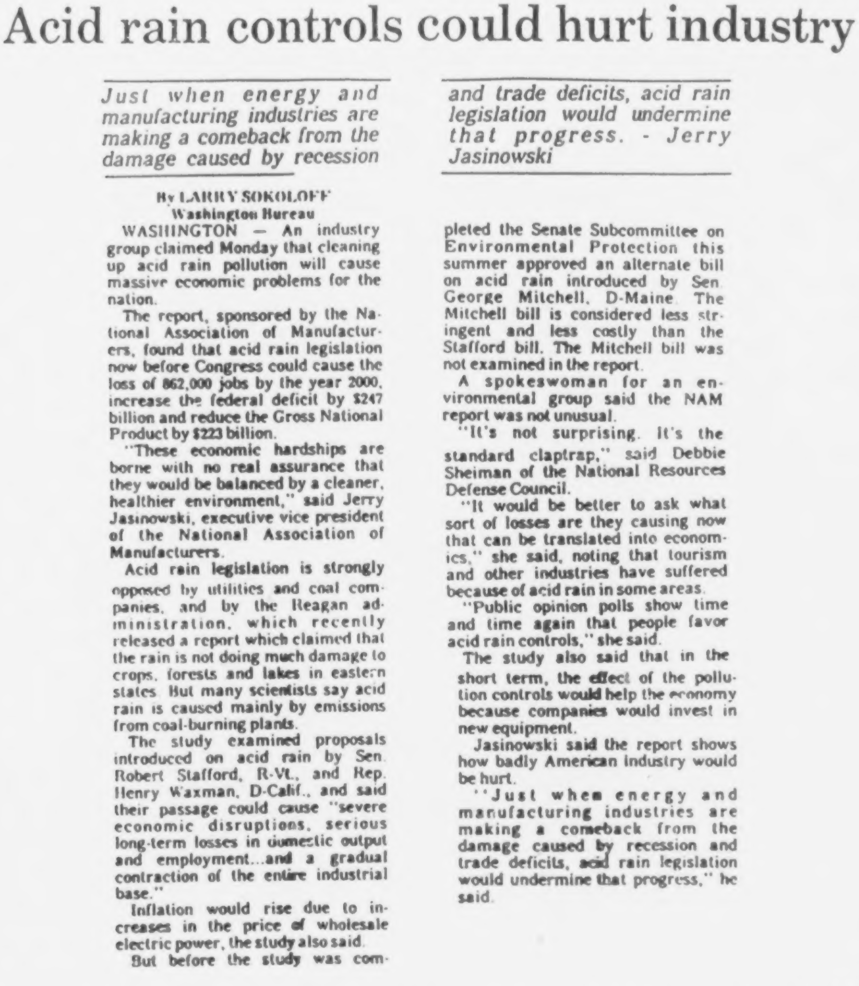
- cost the economy 213,000 to 862,000 jobs by the year 2000,
- result, by the year 2000, in a cumulative loss to the economy, as measured by GNP, of $59 to $223 billion,
- increase consumer costs by as much as 2 percent above the baseline by the mid-to-late 1990's,
- raise retail electricity costs 13.4 percent,
- contribute a full percentage point to interest rates,
- cause a peak loss in the housing industry of 103,000 housing units.51/

Typical of environmental extremist's callous disregard for other's values, a spokesman for the Sierra Club, having only read a summary of the report, said: "this is a dog-bites-man story: Industrial polluters find that acid rain control is expensive. I'm not surprised." A Natural Resources Defense Council spokesperson labeled the report "standard claptrap."52/ These organizations should realize that livelihoods are at stake. Their values, although shared by many, must be balanced with the values of those whose economic survival could be jeopardized.

51/ National Association of Manufacturers, Acid Rain Legislation and the Economy: Executive Summary (September 1987), p. 3.

52/ "Acid Rain Controls Could Hurt Industry," Portsmouth Herald, October 6, 1987. See Excerpt 11.

Excerpt #11: "Acid Rain Controls Could Hurt Industry"



Acid rain controls could hurt industry

Just when energy and manufacturing industries are making a comeback from the damage caused by recession and trade deficits, acid rain legislation would undermine that progress. - Jerry Jasinowski

By LARRY SOKOLOFF
Washington Bureau

WASHINGTON — An industry group claimed Monday that cleaning up acid rain pollution will cause massive economic problems for the nation.

The report, sponsored by the National Association of Manufacturers, found that acid rain legislation now before Congress could cause the loss of 862,000 jobs by the year 2000, increase the federal deficit by $247 billion and reduce the Gross National Product by $223 billion.

"These economic hardships are borne with no real assurance that they would be balanced by a cleaner, healthier environment," said Jerry Jasinowski, executive vice president of the National Association of Manufacturers.

Acid rain legislation is strongly opposed by utilities and coal companies, and by the Reagan administration, which recently released a report which claimed that the rain is not doing much damage to crops, forests and lakes in eastern states. But many scientists say acid rain is caused mainly by emissions from coal-burning plants.

The study examined proposals introduced on acid rain by Sen. Robert Stafford, R-Vt., and Rep. Henry Waxman, D-Calif., and said their passage could cause "severe economic disruptions, serious long-term losses in domestic output and employment...and a gradual contraction of the entire industrial base."

Inflation would rise due to increases in the price of wholesale electric power, the study also said.

But before the study was completed the Senate Subcommittee on Environmental Protection this summer approved an alternate bill on acid rain introduced by Sen. George Mitchell, D-Maine. The Mitchell bill is considered less stringent and less costly than the Stafford bill. The Mitchell bill was not examined in the report.

A spokeswoman for an environmental group said the NAM report was not unusual.

"It's not surprising. It's the standard claptrap," said Debbie Sheiman of the National Resources Defense Council.

"It would be better to ask what sort of losses are they causing now that can be translated into economics," she said, noting that tourism and other industries have suffered because of acid rain in some areas.

"Public opinion polls show time and time again that people favor acid rain controls," she said.

The study also said that in the short term, the effect of the pollution controls would help the economy because companies would invest in new equipment.

Jasinowski said the report shows how badly American industry would be hurt.

"Just when energy and manufacturing industries are making a comeback from the damage caused by recession and trade deficits, acid rain legislation would undermine that progress," he said.

Taken from the Portsmouth Herald (New Hampshire), October 6, 1987

E. Clean Coal Technology: A Better Solution

New technologies for burning coal more cleanly and cost-effectively are being tested today more than ever. Laboratory and pilot scale demonstrations of these technologies are showing promising emission reductions of both SO_2 and NOx, increased conversion efficiency of coal to electricity, reduced capital costs, reduced waste byproducts, etc.53/

Title II, however, would signficantly detract from the clean coal technology program supported both by Congress and the Administration. The cost of the bill's mandatory emissions reductions, coupled with the very short deadline for compliance, would prohibit continued research and testing.54/ Our distinguished Majority Leader, Senator Robert Byrd, has been the chief supporter of this program. Even our tight-pursed Administration embraced the Joint Report of the Special Envoys on Acid Rain which called for a major funding commitment by industry and government. As Administrator Thomas said:

> The Administration has consistently supported the recommendations of the Special Envoys. In fact, the President has requested Congress to appropriate the full $2.5 billion in Federal funds for the program. I believe that the technology demonstration program is a particularly effective way of expanding the control options

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53/ See Office of Fossil Energy, America's Clean Coal Commitment (Washington, D.C.: U.S. Department of Energy, July 1987).

54/ CRS states in this regard: "[T]echnologies, such as IGCC [integrated gasification combined-cycle] and PFBC [pressurized fluidized bed combustion], are primarily designed for new construction which may be needed around the year 2000, and would not meet the title II deadline. . .Title II may provide little or no stimulus for developing other repowering technologies as alternative acid rain measures because of the short deadline. "Acid Rain Control and Clean Coal Technology," (CRS, September 1987), p. 62.

available to operators of existing facilities, lowering control costs, lessening the impacts on high-sulfur coal producing areas, and beginning to reduce the flow of acidic air pollutants over the border into Canada. However, that recommendation was not meant to be implemented in conjunction with a major acid rain control program. It was meant to be an incentive for the commercial demonstration of innovative control technologies. **If an acid rain control bill of the kind contemplated here in fact were enacted into law, then there would be no need for an incentive program.** In fact, given a law requiring control, the Federal government would be ill-advised to subsidize in this way a handful of the many sources that would be required to control emissions.

Furthermore, this control program and a concurrent technology demonstration program would be inherently incompatible: **the control decisions would have to be made before the results of the technology demonstrations were available.** Under the most optimistic assumptions, the first technology demonstrations proposed in this bill would not be operational until about four years after enactment. The initial results of those first demonstrations would not be available for review and evaluation for about five years. Yet, under the terms of the bill, States would have to adopt source-specific regulations within two years, and sources would have to certify the compliance measures they intended to use within three years.

In other words, sources would have to decide upon and certify their compliance measures two to three years before the results of technology demonstrations were available. There would be little opportunity to use widely the innovative control technologies that the nation had just spent five billion dollars to demonstrate.55/

55/ Thomas testimony at 15-16.

III. MOBILE SOURCES

The new mobile source controls contemplated by the Committee bill simply cannot be justified as (i) necessary or (ii) effective. The overwhelming majority of emission reductions that may eventually result from these provisions will necessarily occur in areas that already are or will be in attainment when the reductions begin to have a measurable effect on air quality. Accordingly, the bill's steep vehicle emission reductions would achieve nothing other than gross overcontrol.

A. New Emission Standards Are Unnecessary

1. The Effectiveness of Current Controls

Under current Clean Air Act regulation, motor vehicles must be certified to mandated emission standards through special tests and procedures designed to determine the emission performance. Further, properly used and maintained vehicles must meet these standards for their useful life or be subject to recall by the manufacturers. Table #12 56/ illustrates the reductions that have been mandated as a percent of pre-control exhaust emission levels for cars, light trucks, heavy trucks I (8,500 to 14,000 pounds), and heavy trucks II (over 14,000 pounds). It should be noted that there is some uncertainty with the heavy-duty truck baseline due to test procedure revisions and base year. The reductions shown are for hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NOx). Hydrocarbons

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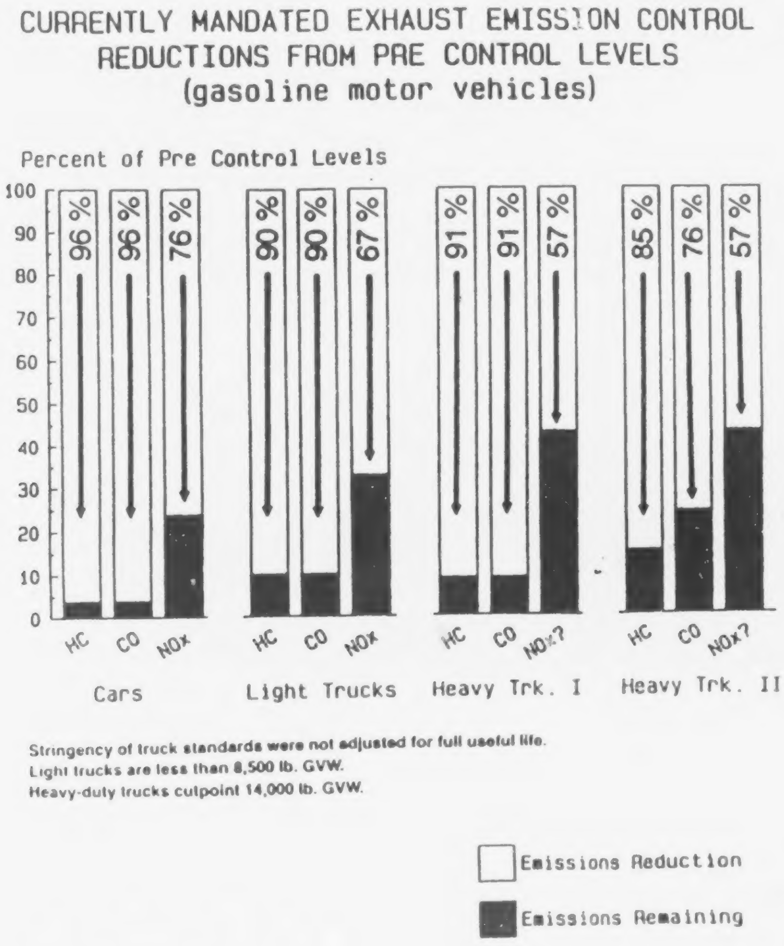
56/ Figures #12 - 15 are from a presentation to the staff of the Environment and Public Works Committee by the Motor Vehicle Manufacturers Association of the United States, Inc., in June, 1987.

Figure #12: Exhaust Emission Reductions from Pre-Control Level



CURRENTLY MANDATED EXHAUST EMISSION CONTROL REDUCTIONS FROM PRE CONTROL LEVELS (gasoline motor vehicles)

Stringency of truck standards were not adjusted for full useful life.
Light trucks are less than 8,500 lb. GVW.
Heavy-duty trucks cutpoint 14,000 lb. GVW.

are controlled because of their potential to generate atmospheric ozone. HC reductions range from 96% for cars to 85% for heavy trucks II. Because of these massive reductions, little is left for further control, leading to diminished returns and limited leverage with tighter standards.

In addition to exhaust control, tight control is placed on the amount of hydrocarbon that evaporates from the motor vehicle. Figure #13 illustrates the evaporative hydrocarbon emission reductions achieved from pre-control levels for vehicles. Passenger cars, light trucks, and heavy trucks are shown at the 96 to 97 percent reduction levels when the volatility of the fuels match the certification fuel. Again, tightening the standards will provide little additional control and diminishing returns.

To validate the impact on air quality and obtain some indication of the in-use effectiveness of vehicular emission controls, the EPA conducted a sampling program inside the Lincoln tunnel, see Figure #14. Comparison of the 1982 data with similar data collected in 1970 indicated a 74% reduction in HC, a 76% reduction in CO, and a 62% reduction in NOx. Because the ventilation rates of the tunnel have not been increased over the 12-year period between sampling events, the reduction measured is attributed to reduced in-use car and truck tailpipe emissions.

Another way to evaluate in-use emission reductions is to obtain and test vehicles through an emissions surveillance program using certification test procedures and a mathematical model to calculate the average emission rate of all vehicles in-use. Based on the Environmental Protection Agency's emission surveillance data and mathematical model (called MOBILE3), a 72% reduction in hydrocarbons, a 67% reduction in carbon monoxide, and a 43% reduction in nitrogen oxides have been achieved for all vehicles in-use from 1970 to 1987. See Figure #15.

Figure #13: Evaporative Emission Reductions from Pre-Control Level

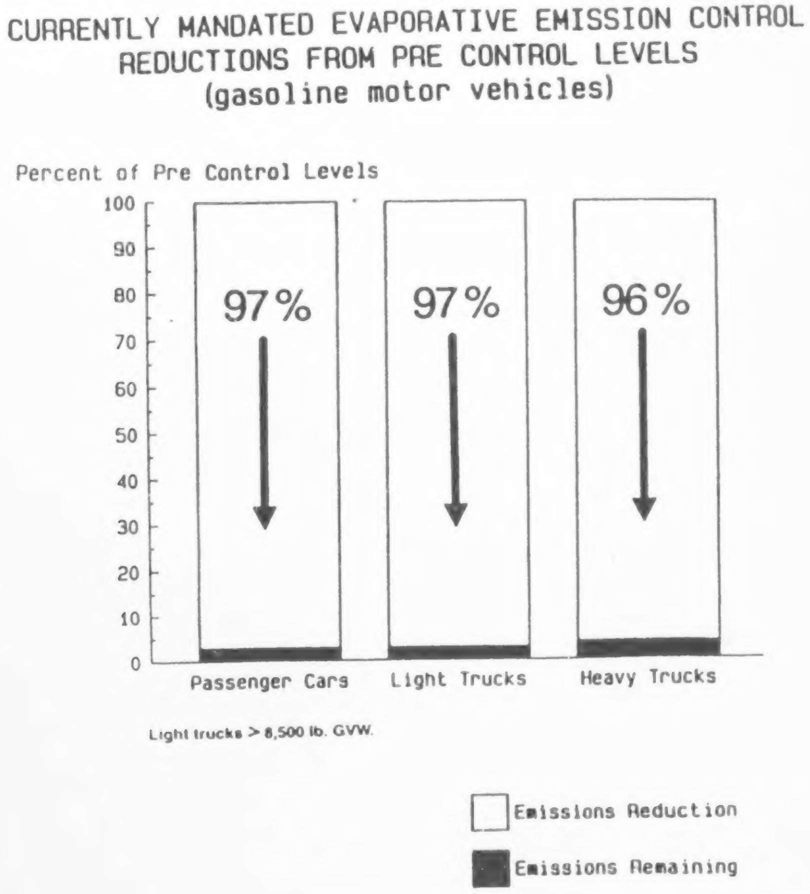
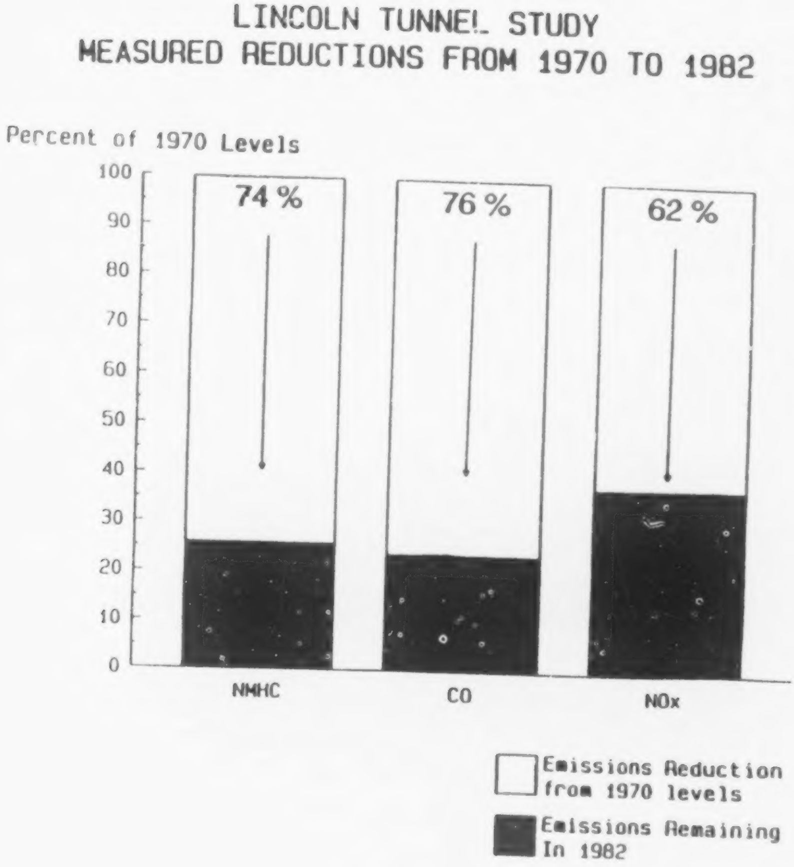
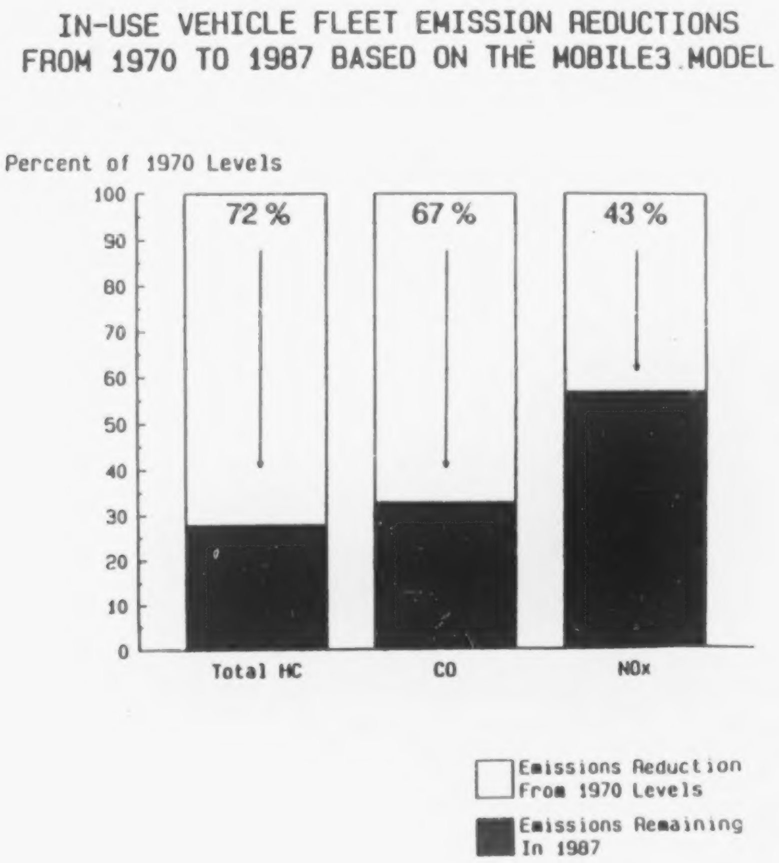


Figure #14: Lincoln Tunnel Study on In-Use Reductions



Source: Environmental Science & Technology, 1986, 20, 790-796

Figure #15: Surveillance of In-Use Emission Reductions



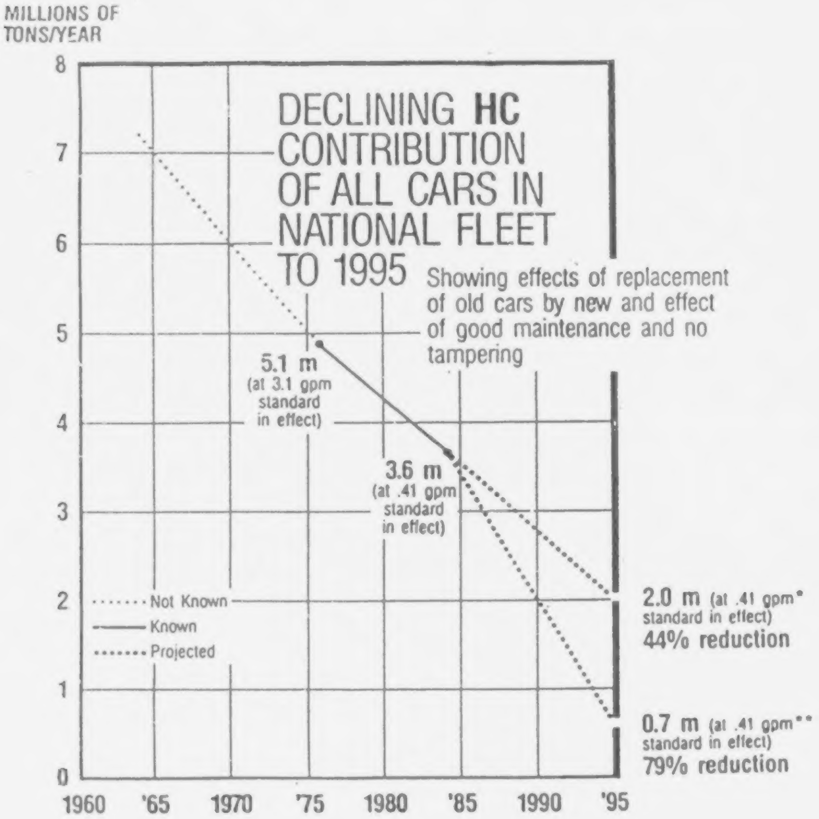
Surveillance data in combination with other data on trends in emission control hardware, in tampering rates, and in misfueling tendencies can be used to estimate historical emission reductions as well as to project future fleet average emissions. Figures #16 - 17 57/ illustrate the average motor vehicle emissions by calendar year for all cars. Figure #16 shows that hydrocarbon emissions will continue to decline at a significant rate well into the next decade, even without improved maintenance and a stable tampering rate. If enhanced I/M programs and the eventual phase-out of lead gasoline improve maintenance and eliminate incentives for tampering as expected, then the decline in hydrocarbon emissions is even more dramatic -- a reduction of as much as 79% from today's levels by 1995. Figure #17 points to even more dramatic reductions occuring in carbon monoxide emissions under the current standard. By 1995, CO emissions will be reduced by no less than 50%, and potentially, given better maintenance and less tampering, as much as 92%.

2. The Nature of the Bill's Proposed Controls

The Committee bill would impose on motor vehicle manufacturers a new wave of significant emission control requirements for HC and NOx above and beyond the strict limits already required under current law.

57/ Taken from "The Effects of Poor Maintenance and Tampering on National Fleet Carbon Monoxide and Hydrocarbon Emissions," Concerning Cars, September 1987, p. 5, tables 4 and 5.

Figure #16: Declining **HC** Contribution of National Fleet

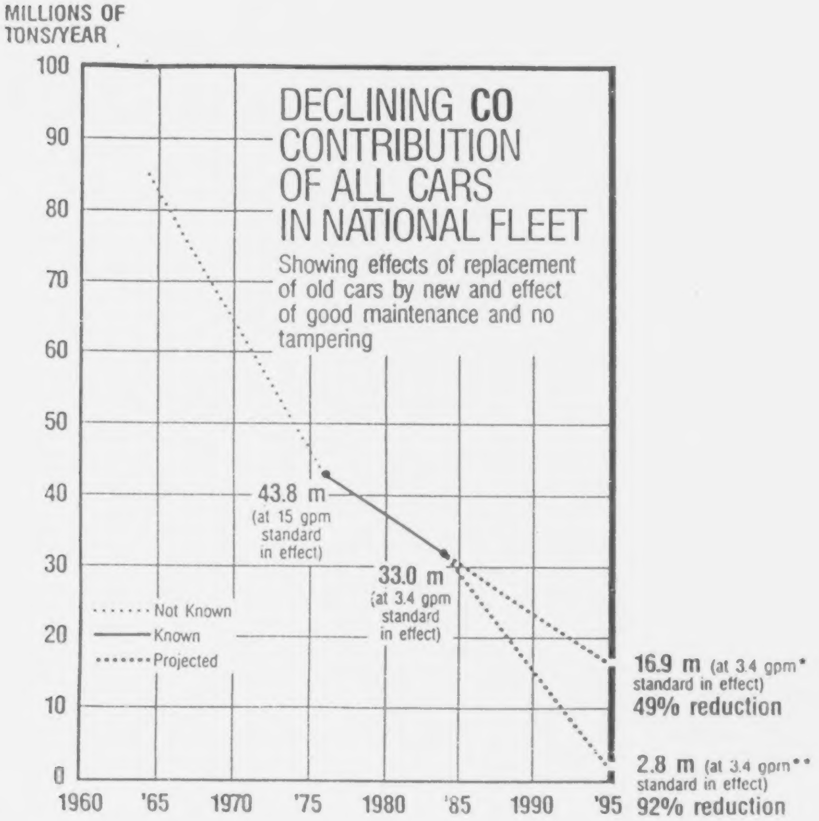


* This 44% reduction in the passenger car fleet emissions *will occur* with the present .41 gpm control standard, as older cars are replaced by new ones. It will occur *even allowing for poor maintenance and tampering*

** If *all* cars were to meet the standard — that is, if they were all well maintained, if no tampering took place, and if manufacturers could eliminate manufacturing margins of error — a decline of some 79% from 1984 levels would take place, as new cars with today's controls replaced old ones. 1984 levels were already greatly reduced from precontrol times

Taken from Concerning Cars, Volume 3, Number 4

Figure #17: Declining CO Contribution of National Fleet



* This 49% reduction in the passenger car fleet emissions *will occur* with the present 3.4 gpm control standard, no matter what we do, as older cars are replaced by new ones. It will occur *even allowing for poor maintenance and tampering.*

** If *all* cars were to meet the standard — that is, if they were all well maintained, if no tampering took place, and if manufacturers could eliminate manufacturing margins of error — a decline of more than 90% from 1984 levels would take place as new cars with today's controls replaced old ones. 1984 levels were already reduced from precontrol times.

Taken from Concerning Cars, Volume 3, Number 4

a. Cars, Trucks, and Vans

For light-duty vehicles (LDVs), the existing standards for HC and NOx achieve reductions from uncontrolled emission levels of 96 percent and 76 percent, respectively. The bill would lower the LDV HC standard by an extra 40 percent, and the LDV NOx standard by an extra 60 percent.58/ The bill also would require steep reductions in HC, NOx and CO emissions from light-duty trucks (LDTs), and even sharper reductions in "small" LDTs (i.e., those having gross vehicle weights of 6,000 or less), which would have to meet the even lower car standards.59/ Heavy duty trucks (HDTs) would also have to meet drastically lower limits for NOx and particulates.60/

The Committee bill does not stop there. Apart from reducing the numerical emission limits, the bill adds a series of new testing and compliance measures that would make the new limits even stricter -- i.e. require still more emission reductions beyond those needed to meet the new numerical limits alone.

58/ The LDV HC standard would be lowered from 0.41 grams per mile (g/mi) to 0.25 g/mi, and the LDV NOx standard would fall from 1.0 to 0.4 g/mi.

59/ The bill would reduce the LDT standards as follows: (i) for HC, from 0.8 to 0.5 g/mi, a 38% reduction; (ii) for NOx, from 2.3 to 0.5 g/mi, a 78% reduction; and (iii) for CO, from 10.0 to 5.0 g/mi, a 50% reduction.

For small light trucks and vans that would have to meet the bill's new standards for cars, the corresponding reductions are 69% for HC, 83% for NOx, and 66% for CO.

60/ The HDT NOx standard would be lowered to 4.0 grams per brake-horsepower-hour (g/bhp-hr) by 1991 and to 1.7 g/bhp-hr by 1994; the particulate limit would be set at 0.1 g/bhp-hr by 1991 for buses and 1994 for all other HDVs.

First, the bill would prescribe a 90 percent pass rate for assembly line emissions compliance testing, a rate considerably more stringent than the 60 percent rate EPA has found to be adequate. The record before the Committee reveals that this higher pass rate could require as much as an additional 33 percent emission reduction for some engine families. To illustrate this effect, the bill would lower the HC standard for LDVs from 0.41 to 0.25, but the stricter assembly line testing requirement would effectively lower the standard even further, to 0.17 g/mi, for a 59 percent reduction overall.61/

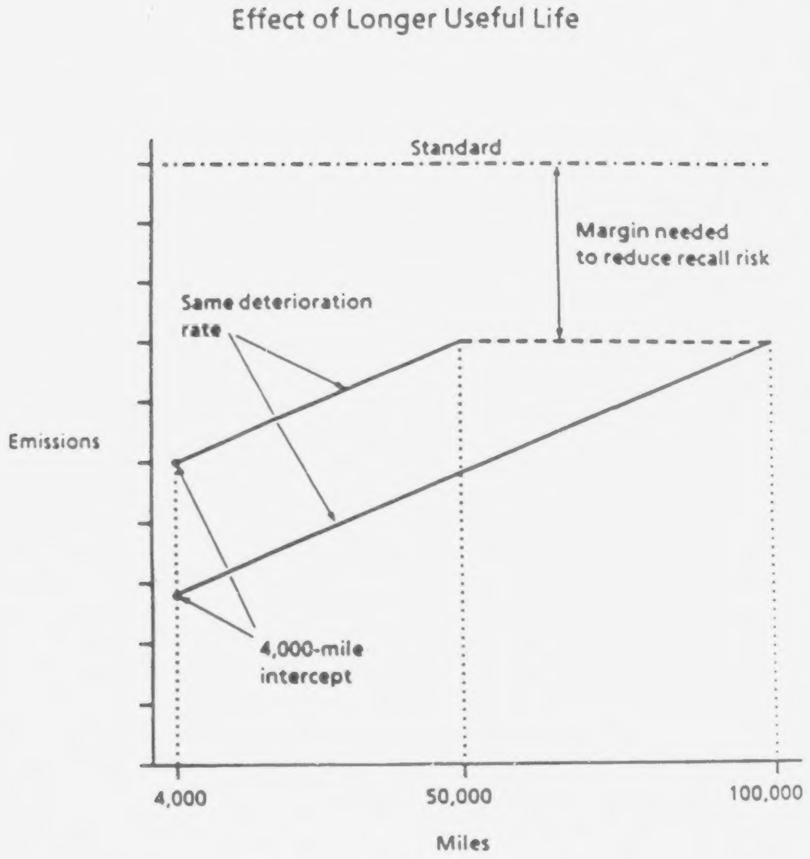
Second, the bill doubles the statutory "useful life" (i.e., recall and warranty) period for in-use compliance with the new LDV emission limits, from 5 years/50,000 miles to 10 years/100,000 miles. The effectiveness of vehicle emission controls deteriorates slowly as mileage increases, even in the absence of tampering, misfueling, or poor maintenance. As depicted on Figure #18 62/ the point at which a standard deterioration rate for a 100,000 mile useful life intersects with 4,000 miles is considerably lower than for a 50,000 mile useful life. In other words, the doubled "useful life" period requires manufacturers to anticipate a longer period of deterioration, and therefore to design and produce cars with even lower assembly line emissions than would otherwise be necessary -- perhaps 40 percent lower.63/

61/ CRS Report at 4; Testimony of Samuel A. Leonard, Director of Emission Control Department, Environmental Activities Staff, General Motors Corporation, to the Subcommittee on Environmental Protection, Senate Committee on Environmental and Public Works, April 9, 1987, p. 13 ["Leonard Testimony"].

62/ Taken from Leonard Testimony at 10. *See* also the *Additional Views of Senator Pressler*.

63/ Leonard Testimony at 10.

Figure #18: Effect of Useful Life on Initial Standard



Although the effects of the useful life and assembly-line testing provisions are not additive, the combined effect of these two provisions would result in a far greater degree of control than the lower emission limits alone. To make matters worse, the bill adds a provision that could make manufacturers responsible for noncomplying emission control systems that are the result of improper maintenance by vehicle owners, and also includes a murky but potentially impossible requirement (to meet or administer effectively) that "each and every vehicle" comply with the standards in use.

The information available to the Committee has identified no new control technologies, available today or in the future, for achieving further vehicle emission reductions of these magnitudes. In fact, it is evident that efforts to "fine tune" today's state-of-the-art vehicle emission controls cannot achieve the in-use performance levels required by the Committee bill. The bill therefore would likely result in either (i) new cars that are less acceptable to consumers, or (ii) delays, interruptions or cancellations of some new vehicle lines as certificates of conformity are denied or suspended, or recalls are ordered..

Even assuming that emission reductions this steep could somehow be eked out by tinkering with current controls, one would at least hope that such measures would contribute substantially to solving the Nation's nonattainment problem. But the truth is quite different. The new standards would apply only to new vehicles manufactured in the early 1990's, but their air quality impact would not be felt until 10 years later, since it generally takes that long for new cars to substantially penetrate the on-the-road fleet.

Specifically, the Committee bill effectively demands that, with the single exception of Los Angeles, all areas of the country are to be in attainment within 10 years, or by 1997.64/ Yet, the new vehicle emission limits would have virtually no effect during that period. For example, EPA's MOBILE3 emissions model shows that, between 1987 and 1997, vehicle replacement under the current 0.41 g/mi HC standard would reduce total HC emissions for passenger cars by 42 percent, and the bill's new 0.25 g/mi standard would contribute only an additional 2 percent.

Emissions reductions could be better achieved by sustaining or even accelerating vehicle replacement -- not hindering it with unattainable standards that increase cost, reduce performance, lower fuel economy, or limit driveability of new vehicles. And since well under 10 percent of the Nation's vehicles are registered in the Los Angeles area,65/ it is equally evident that **substantially over 90 percent of the new regulatory burdens imposed by the mobile source provisions of the Committee bill are entirely unnecessary.**

b. Motorcycles

The motorcycle emissions standards required by Section 301(e) of the Committee bill are also of concern. There is no measurable

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64/ The bill establishes a 10 year attainment deadline (i.e., 1997) for all post-1987 nonattainment areas except those where design values are above 125% of the standard, which are assigned a 15 year date (i.e., 2002). According to EPA's latest data compilation, only Los Angeles would qualify for the 15 year deadline. See EPA, "Note to Correspondents," August 27, 1987, p. 5. To be sure, the bill permits a three-year extension of the 5, 10, and 15 year deadlines. Nonetheless, the strict "good faith" test to qualify for these extensions, together with the substantial additional controls that would automatically accompany them, will make these extensions unacceptable to most states.

65/ The entire State of California contains about 11% of all registered vehicles. MVMA, Motor Vehicle Facts and Figures '87, at 22.

benefit to be realized from placing additional emission controls on motorcycles as they are such a small part of the vehicle population. Motorcycles contribute less than 0.3 percent of all VOC emissions. The proposed motorcycle emissions standards could be described as "trying to shoot a fly with an elephant gun."

The Committee bill's carbon monoxide standard for motorcycles is even more difficult to justify. CO nonattainment today is largely due to cold temperatures at high altitudes. The number of "motorcycle miles travelled" during cold periods at high altitudes is extremely small.

The Committee bill's proposed standards will undoubtedly force higher motorcycle prices, hurting the domestic motorcycle industry as well as the thousands of Americans who earn their living by selling and servicing motorcycles. The industry has estimated that the additional cost per unit imposed by the bill would be as much as $450 dollars in some cases. Such a sharp increase in costs would be disastrous to an industry whose sales are annually declining.

The Environmental Protection Agency is currently considering what type of control is appropriate for motorcycles. In 1978, EPA regulations established the following classes of motorcycles for the purpose of regulating emissions:

Class I - 50 to 169 cc
Class II - 170 to 279 cc
Class III - 280 cc and over

Without good reason, the Committee bill legislatively alters EPA's classifications, once again replacing professional judgment with political fiat. Given its current flexibility, EPA could address motorcycle hydrocarbon emissions in a much more effective and less costly way. For example, more pollution-per-dollar could be controlled by foregoing the Committee bill's tightened CO and expensive evaporative emission controls, placing in their stead additional controls on exhaust emissions. This can be done without excessive expense. In addition, it is a much more cost-effective way to reduce VOC's than evaporative emission controls, and would avoid the driveability problems associated with tighter CO standards.

B. Title III's Standards Are Unacceptable

1. Could Be Counterproductive to Health

It is bad enough that the mobile source provisions in Title III of the Committee bill are unnecessary. What is even more troubling is that several of the bill's measures will actually impede local efforts to attain the ozone and CO standards and worsen air quality.

For example, Title III (as well as Title I) would require substantial further reductions in NOx emissions nationwide, irrespective of unique or localized air quality problems. It is now broadly accepted in the scientific community that reducing NOx emissions in some settings may work at cross purposes with the goal of reducing ambient ozone levels.

Specifically, increased regulation of NOx emissions may actually increase ozone concentrations in some areas, a phenomenon scientists call the "NOx inhibition effect." In the complex chemical process leading to the formation of ozone, NOx can both promote and inhibit ozone formation, depending on the atmospheric HC/NOx ratio. Based on research conducted by EPA and others on this subject, it can be shown that more stringent NOx control could negate the ozone improvements otherwise resulting from HC control in most major U.S. cities.

In other words, the Committee bill actually would erect substantial obstacles to ozone attainment precisely in those few remaining areas of the Nation where significant further measures are needed. No wonder EPA Administrator Thomas has expressed "concern

[that] some of the NOx provisions of this bill could actually exacerbate the ozone problem."66/ Since only a few counties in the Nation (in the Los Angeles area) currently do not attain the nitrogen dioxide (NO2) air quality standard, trading further NOx reductions for increased ozone levels would be both wasteful and counterproductive.

Likewise, the sharp mobile source emission reductions sought in the Committee bill may well take us backward rather than forward, especially in the short run. It stands to reason that impracticable new controls that delay or interrupt the availability of new vehicles, or impair their driveability or fuel economy, will lead some consumers to defer new vehicle purchases and keep their existing vehicles longer. If enough potential new car buyers follow this course, the result will be deteriorating air quality because older vehicles are less well controlled than the new ones that otherwise would have replaced them.

This prospect is more than just theoretical. A Brookings Institution study of the last round of vehicle emission standards has confirmed that "even a small change in scrapping rate [i.e., vehicle turnover] can exert a significant effect on short-run emissions outcomes," so that **"any regulation that results in higher new car prices will raise aggregate emissions."**67/ In fact, the Brookings study concluded that costly new car HC controls may lead to increased emissions for as long as five years after the standards take effect.68/ Thus, the bill's mobile source provisions may actually make attainment more difficult in the near-term, during the

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66/ Thomas testimony at 34 (emphasis supplied).

67/ Brookings Institution, Regulating the Automobile (1986), p. 97.

68/ Id.

period when a substantial number of areas now only marginally "nonattainment" would otherwise be coming into attainment solely because fleet turnover would ensure broader penetration of the state-of-the-art controls already required under the Act.

The Brookings analysis also concludes that even over the longer run, "it is obvious that costs must greatly exceed benefits since the incremental costs of [vehicle emissions] control rise rapidly in the vicinity of _current_ standards."**_69_**/ One important reason for this is that "_the relationships between [motor vehicle] emissions and air quality measures is tenuous at best_."**_70_**/ As the Brookings study observed:

> Surprisingly and even shockingly, Congress has legislated emissions controls on mobile, industrial, and utility sources without insisting upon careful measurement of the effects of these programs. Expenditures on air pollution controls have exceeded $20 [now $31] billion a year in recent years, but there appears to be little interest in spending even as much as 1 percent of that amount to measure the effect of these expenditures upon air quality.
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> * * * *
>
> Finally, it is unlikely that even the full implementation of the monitoring network planned by the EPA will be sufficient to capture the effects of mobile-source controls across the many air sheds with air pollution problems. Congress must show some interest in gauging the effects of automobile emissions controls before the EPA will develop a monitoring system and an analytical framework that is capable of measuring the impact of exhaust controls upon local air quality._71_/

_69_/ _Id_.

_70_/ _Id_. at 98.

_71_/ _Id_. at 99.

The Brookings study estimates that "the annual costs of the current automobile emissions program are certainly greater than $10 billion a year."72/ Given the ineffective and, in many respects, counterproductive character of tighter controls and what Brookings calls the "rapidly" rising marginal costs of obtaining incremental emission reductions, it is evident that the mobile source controls in the Committee bill are seriously flawed.

2. **Will be Economically Damaging**

Even if the Committee bill provided the most effective path to ozone and CO attainment -- which it most assuredly does not -- the wisdom of the bill could be seriously questioned because of its heavy social and economic costs in the form of lost jobs, reduced competitiveness, and severe community-wide impacts. At least two features of the bill guarantee that these effects would occur in serious and even alarming proportions:

(1) The imposition of extremely costly and, in many instances, unachievable new control requirements;

(2) Severe economic constraints on the modernization efforts that are vital to the efforts of many industries to improve competitiveness.

The following discussion focuses on just a few provisions of the bill to illustrate these effects.

a. **Plant closures**

Apparently pursuing an overriding philosophy of immediate attainment at any cost, the Committee bill looks first to stationary

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72/ Id. at 114.

and mobile sources that already are widely and strictly controlled for still more emission reductions, and then expands the coverage of these impossibly strict control requirements to smaller sources, many of which lack the financial wherewithal to comply. The result could be widespread plant closures and accompanying layoffs.

This is especially true of the bill's impossible mobile source control provisions. For example, EPA has warned that the 1994 NOx standard for heavy duty trucks is not attainable "using any technology we can envision."[73] That would mean, obviously, that the manufacture of new heavy-duty truck engines would grind to a halt, and associated industries such as truck and bus body manufacturing, truck trailer manufacturing, and part/accessories suppliers, would also suffer a heavy economic blow.

More broadly, we have already seen that the sharp emission reduction requirements of the Committee bill are likely to prove to be impossible for many individual vehicle lines. Particularly in combination with the bill's "super RACT" provisions that would introduce major new control burdens for many automotive assembly plants, the result would likely be the shutdown of the assembly plants producing those vehicles. Because nearly 14 percent of all domestic employment is related to the motor vehicle industry, even the possibility of plant closures in this industry should be a matter of serious national concern.

b. Reduced Competitiveness

The Congress is all too familiar with the plight of many domestic industries, including heavy manufacturing sectors that are vital sources of American jobs, which today are heatedly competing with foreign businesses in markets that are increasingly international in scope. We in Congress are working hard to assist the efforts now underway in those industries to improve their ability to compete with overseas manufacturers. Several features of the Committee's Clean Air Act Amendments bill will cut out the heart of these efforts in many industry sectors.

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[73] Thomas testimony at 19.

First, the sharply increased point source control costs of the bill, including especially the widespread application of "super RACT", effectively bestows on overseas manufacturers an undeserved competitive windfall. Domestic producers that somehow manage to comply will often find themselves with substantially increased costs that cannot readily be passed on to consumers. Lost market share, plant shutdowns, and increased layoffs would be inevitable.

Making matters even worse, the Committee bill would also strangle current efforts by domestic producers to modernize existing plants and equipment to lower costs and increase efficiency. Such plant modifications would be subject, in all post-1987 nonattainment areas, to a new "super LAER" requirement far stricter than the LAER provision of current law. As if that were not enough to smother ongoing efforts to improve competitiveness, the bill's bans on emissions trading and bubbling ensure that "super LAER" will cover many more units and operations in these facilities than is now the case. Even in cases in which these provisions are affordable at all, they may destroy the cost-cutting incentive for considering plant modernization in the first place.

Over and above these serious handicaps, domestic automakers would face yet another severe challenge to maintaining competitiveness. Although foreign producers would have to meet the same emission reductions on the vehicles they make for sale in the U.S., it is generally more difficult to control emissions from larger vehicles and engines, which represent a vital market segment for full-line domestic manufacturers. Thus, particularly compared to foreign competitors specializing in small cars, domestic firms could well experience more production delays or curtailments, more recalls and higher warranty costs, greater losses in driveability or fuel economy, and higher compliance costs. The Congressional Research Service has estimated that the result could be lost sales to imports of as much as $10 billion per year, accompanied by layoffs of over 200,000 workers.74/

74/ Congressional Research Service, "Mobile Source and Other Federal Controls: An Analysis of Title III of the Proposed Clean Air Standards Attainment Act", September 14, 1987, p. 19.

IV. NATIONAL AMBIENT AIR QUALITY STANDARDS

A. Current Law: Science Drives the Criteria Review

Section 108 and 109 of the Clean Air Act govern the establishment and revision of scientific criteria and national ambient air quality standards (**NAAQS**). The 1977 amendments added a requirement that the then existing criteria and standards be reviewed and revised (if appropriate) by December 31, 1980 and every 5 years thereafter. The EPA established standards for six "criteria" pollutants in 1971 - particulate matter (as TSP), sulfur oxides (as SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), photochemical oxidants (as O_3), and hydrocarbons (as VOCs). The Agency listed lead as a criteria pollutant in 1976 and established a lead standard in 1978. The hydrocarbon criteria were revised and the related NAAQS was rescinded in 1983. EPA has revised the scientific criteria and reviewed the standards at least once for all of the NAAQS pollutants with final actions taken on ozone (revised 1978), CO (reaffirmed 1985), NOx (reaffirmed 1985), and TSP (revised 1987). Active revisions are underway for sulfur oxides (proposed action scheduled this fall), ozone, lead, and fine particles, and work is proceeding on a scientific assessment in support of a decision of whether or not to list acid aerosols as a new criteria pollutant.

Changes made to the process of developing criteria and standards have substantially enhanced public participation and the scientific quality of the end results. These changes, however, have lengthened the time for reviewing criteria and standards. The EPA has initiated steps to reduce delays in the process, for example by developing addenda to existing scientific criteria rather than undertaking wholesale revisions of entire documents. EPA believes that although improvements can be made with respect to timeliness, the current process is fundamentally sound, and the criteria and staff assessments of alternative standards have received high marks from the Clean Air Scientific Advisory Committee -- the external scientific panel established in the Clean Air Act to advise the Administrator on criteria and NAAQS.

B. Committee Bill: Politics in the Driver's Seat

The Clean Air Act, as amended and currently administered, establishes a rational scientific procedure for adoption of national ambient air quality standards to protect the health and welfare of American citizens, a process that is serving us well. When sufficient scientific basis is available for rational decision-making, EPA promulgates standards; when sufficient data are not available, EPA can resist pressure to act on the basis of suspicion or allegation.

Title IV of the Committee's bill could disrupt this orderly process. It would impose on EPA the potentially impossible, unnecessary and nonproductive tasks of either promulgating legislatively mandated standards, or proving that such standards are unnecessary. This latter alternative, of course, would be an almost insurmountable task considering the hype, propaganda, and pumped-up political rhetoric the Administrator would have to overcome in making a case against issuing standards. National Ambient Air Quality Standards should be issued without the prejudice of such political pressures.

This politicization of what has hitherto been a purely scientific process could result in poorly thought-out and unjustifiable standards, further exacerbating the social and economic burdens imposed by the Clean Air Act. This was fully explained by EPA Administrator Thomas when he said:

> The promulgation of national health and welfare standards under the Clean Air Act is one of my most important responsibilities, and I take that responsibility very seriously. During my tenure I have reviewed several of the existing national standards; some I have decided to

> retain, and one I decided to change. But in all cases my decisions were predicated on a careful weighing of all the scientific evidence pertinent to the question. Consequently, after the decisions were made, I could defend them and implement them with the knowledge that the science as a whole, despite uncertainties and incomplete data, justified my action. . .This bill seems to abandon our traditional reliance on sound science.75/

Under Title IV of the Committee bill, EPA would be given only one year to revise (or prove revising unnecessary) scientific criteria for several air pollutants and simultaneously to promulgate a one-hour primary ambient air quality standard for sulfur dioxide; at respective twelve-month intervals thereafter, EPA is to promulgate (a) a secondary fine particulate standard, (b) a six- to twelve-hour primary ozone standard and a secondary ozone standard; (c) a short-term nitrogen dioxide standard; and (d) a primary standard for acid aerosols. Clearly, these deadlines preclude careful weighing of all pertinent scientific evidence, and they simply cannot be completed on time. Thus, inevitably, the mandated actions either will lead to superficial consideration of science and hasty, poorly-thought-out decisions, or they will result in litigation with the probability that Court decisions will force the adoption of unbalanced and counterproductive standards. In short, the traditional reliance on sound science in adopting air quality standards will have been abandoned in the interest of raw political expediency.

75/ Thomas testimony at 20-21.

V. AIR TOXICS

A. Current Protections Against Air Toxics

As EPA has noted in its testimony and its Air Toxics Strategy announced in June 1985, progress in dealing with air toxics should be viewed in a much broader context than just regulation under section 112 of the Clean Air Act. In this broader context, EPA's reports on its activities support their view that substantial progress is being made. EPA has set in motion a large number of Federal regulatory activities under section 112 and other sections of the Clean Air Act (as well as other EPA legislative authorities), pollutant and source assessments, State and local program development activities, and technical assistance projects which should soon begin to show tangible results in terms of a better understanding of what the problem is (and is not), possible solutions, and actual emission reductions.

More specifically, EPA: (1) has completed assessments for 36 pollutants (20 have been decisions to regulate), (2) has assessments underway for 33 others, (3) has national emission standards for hazardous air pollutants (NESHAPS) under development for about 23 categories, (4) is using the authorities under sections 111(b) and 111(d) to deal with emissions from wood stoves and municipal waste combustors, (5) is using RCRA to regulate toxic air emissions from hazardous waste treatment, storage and disposal facilities, and (6) is planning to use TSCA to regulate chromium emission from comfort cooling towers and certain sources of chlorinated solvent emissions.

To date, EPA has screened and ranked over 800 pollutants for

Table #19: Schedule For Air Toxic Regulations

SCHEDULE FOR AIR TOXIC REGULATIONS CURRENTLY UNDER DEVELOPMENT

Pollutant/Source Category	Proposal Date	Promulgation Date
Asbestos Revision - Demolition & Renovation	6/87	9/88
Chromium - Comfort Cooling Tower*	8/87	11/88
Chromium - Ind. Cooling Tower	6/88	9/89
Chromium - Electroplating	6/88	9/89
Hazardous Organic NESHAP (all 8 organic compounds for which "intent-to-list" has been published and the following:) Butadiene Production Misc. Butadiene Sources CFC Production Ethylene Oxide Prod. Ethylene Dichloride Prod. Chlorinated HC Production Styrene Butadiene Rubber Polybutadiene Production Neoprene Production Chlorine Production Chlorinated HC Use in Chemical Production Pesticides Production Pharmaceutical Production	3/88	5/89
Ethylene Oxide - Commercial Sterilizers	8/88	12/89
Perchloroethylene - Dry Cleaning	8/88	11/89
Trichloroethylene - Degreasing (Also covers percloroethylene, methylene chloride)	9/88	12/89

Pollutant/Source Category	Proposal Date	Promulgation Date
Coke Over Emissions - Charging & Topside Leads	proposed 4/23/87	7/88
Benzene - Coke Oven By-Product Plants	6/84	7/87
Benzene - Coke Oven By-Product Final Coolers	reproposal 7/87	6/88

The projects listed below are in various stages of study. No decisions has been made yet on whether or not standards are warranted.

Multi-Pollutant Source - Indus. Wastewater Treatment
POTW's
Municipal Waste Combustion
Sewage Sludge Incineration

Butadiene - Nitrile/ABS Rubber

Ethylene Oxide - Hospital Sterilizers

Methylene Chloride - Polyurethane Foam
Paint Stripping
Aerosols
Adhesives, Coatings
Product Formulators

Chloroform - Pulp Manufacturing

Cadmium - Primary Cadmium Smelters

*Regulation under the Toxic Substances Control Act is being considered.

possible listing under Section 112.76/ Of these, eight have been listed as hazardous air pollutants (**HAPs**) and over 70 others are at various stages of processing as follows:

- 10 pollutants have been subject to formal EPA declarations of intent to list;
- 14 have been thoroughly studied and formally rejected for listing;
- 12 have been subject to a detailed health review and are under study for possible listing; and
- 23 have been subject to a preliminary health effects screening, and similar screening for 14 others will begin later this year.77/

With respect to Section 112 standards limiting emissions of listed HAPs, EPA has evaluated possible controls for over 50 major sources of the six probable human carcinogens that have already been listed. EPA has published detailed risk, exposure, and feasibility analyses for many of the categories of stationary sources emitting significant quantities of these six HAPs. In general, these analyses provide EPA estimates of the health risks both under current levels of control and under various alternatives for stricter control.

Other activities which have or will reduce air toxics emission, either directly or indirectly, include: revised State implementation plans for ozone and the new particulate matter NAAQS; mobile source regulations for diesel cars and trucks, catalyst

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76/ Letter dated June 19, 1987 from EPA Administrator Lee M. Thomas to John D. Dingell (responding to questions posed in Rep. Dingell's April 8, 1987 letter to Mr. Thomas).

77/ *Id.* *See* Tables 19 and 20.

Table #20: Toxic Air Pollutant Evaluation and Control Program

TOXIC AIR POLLUTANT EVALUATION AND CONTROL PROGRAM[1]

Preliminary Health Source Screening	Detailed Assessment	Intent-to-List Sec. 112	Decision not to Regulate	Listed under Sec. 112	NESAHP Proposed	NESHAP Promulgated
Propylene	Chlorine & HCl	Chromium	Toloene	Asbestos	Benzene	Mercury
Propylene Oxide	Phosgene	Carbon Tetrachloride	POM	Beryllium	Coke Oven Emissions	Beryllium
Ammonia	Acetaldehyde	Ethylene oxide	CFC-113	Vinyl chloride		Asbestos
Zinc & Zc Oxide	Acrolein	Chloroform	Methyl chloroform	Coke Oven Emissions		Vinyl chloride
Styrene	Hydrogen sulfide	Ethylene dichloride	Epichlorohydrin	Benzene		Benzene
Naphthalene	Beryllium 2/	Cadmium	Manganese	Arsenic		Radionuclides
Toloene diisocyanate	Dibenzofurans	1-3-Butadiene	Chlorobenzenes	Radionuclides		Arsenic
Xylenes	Gas vapors	Methylene chloride	Vinylidene chloride	Mercury		
Ethyl chloride	Asbestos 2/	Perchloroethylene	Hexachlorocyclopentadiene			
Methyl methacrylate	Dioxins	Trichloroethylene	Chloroprene			
Maleic anhydride	Formaldehyde		Acrylontrile3/			
Phthalic anhydride	Mun. Waste Combustor Emissions		Nickel			
Methyl isocyanate			Phenol			
Min. Fibers			Copper			
Hydrogen fluoride						
Phosphorus						
Sodium hydroxide						
Hydrocyanic acid						
Selenium & compnds.						
Mercuric chloride						
Bromine & inorganic compounds						
Dimethylamine						
Methanol						

Assessment Planned Later in 1987

- Carbon Disulfide
- 2, 5 Toluene Diamine
- Hexahydro-azepin
- Methyl Chloride
- Cumene Hydroperoxide
- Camphechlor (Toxaphene)
- Phthalates
- Titanium Dioxide
- Organophosphate Pesticides
- Warfarin
- Carbofuran
- Nicotine

1/ As of May 11, 1987.
2/ Reassessment of original health effects information
3/ Referred to States for evaluation

controls for gasoline engine vehicles, and onboard controls for benzene and gasoline vapors; the proposal under TSCA to greatly restrict the future use of asbestos; the cancellation under FIFRA of carbon tetrachloride, carbon disulfide and ethylene dichloride in pesticide formulations; and site cleanups and accidental release programs under CERCLA.

In the State and local air toxics program, good progress is being made in carrying out the major themes EPA has identified for these programs: NESHAP enforcement delegation; addressing high risk point sources; evaluation and mitigation of multi-source, multi-pollutant problems in large urban areas; enhancement of State/local capabilities and authorities; and accidental release preparedness and response. Further details of these activities have been provided in correspondence with this Committee and the House Committee on Energy and Commerce.[78]

B. The Consequences of Irrational Toxics Regulation

1. The "Control Strategy" of Title V Described

a. Technology-based regulations

Title V incorporates a specific list of chemicals to be regulated under Section 112(b) of the Clean Air Act. These chemicals are drawn primarily from other statutory lists designed for very different purposes.[79] No showing of public health risks

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[78] Id.

[79] The list is composed of those substances either on the list referenced by section 313 of the Superfund Amendments and Reauthorization Act of 1986 (Pub. L. 99-499), or listed pursuant to

(continued on next page)

posed by the listed chemicals is required.

Substances may be added to or deleted from the list based on certain criteria. Emission standards for all listed substances must be complete within 10 years.

The bill would require the maximum degree of reduction achievable (**including a prohibition on emissions**), considering cost and other non-air quality health factors. The reduction requirement is the most stringent level achieved in practice by a similar source. Requirements may include design and equipment technologies, work practices or operational regulations. **The role of EPA in private business management is considerably expanded under this provision.** However, there is no provision in the bill to clarify the liability of the U.S. Government for design, work practice or operational decisions.

Any stationary source which emits a substance for which an emission standard has been established under section 112 (as amended by the Committee bill) is required to have an emissions permit. This provision includes new and modified sources as well as existing ones. This sweeping permit program will be extremely burdensome on EPA, states, and regulated industries. Community growth and technological advancements will be put on hold while industrial modification permits are processed.

Within 12 months of enactment, the Administrator is to compile a national inventory of area source emissions of the substances listed by this section. Emissions from area sources are to be reduced by 25% of the inventory within four years, 10% during each

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section 104(i) of the Comprehensive Environmental Response and Liability Act (CERCLA), and for which states have set acceptable ambient concentrations as reported in the NATICH data base for July, 1986.

of the next three two-year periods, and by a total of 55% within 10 years.

b. Health-based regulations

This section specifies a list of eight hazardous air pollutants (**HAPs**) for which **health-based standards** are to be set. It requires the Administrator to add to that list any air pollutant that can be "reasonably anticipated" to cause significant adverse effects to health or the environment.

Within 36 months, the bill requires EPA to promulgate emission standards for the listed air pollutants at a level which provides an **ample margin of safety** to protect public health, unless a more stringent standard is required to protect the environment. The bill precludes consideration of costs, feasibility, or other factors in determining the appropriate emission standard.

The Committee bill does permit the deadline for achieving such standards to be extended for eight years in cases of "extraordinary economic hardship," provided that, in the interim, (i) a technology-based standard is met, and (ii) "reasonable further progress" is made toward the health-based standard.

The bill provides for two types of health-based standards. First, the current "ample margin of safety" standard-setting formula is retained, except that consideration of costs, feasibility and other practical concerns is prohibited. Second, an "interim standard," to be reviewed every five years, is available for "probable" or "possible" carcinogens, and would require controls sufficient to reduce the risk to "the most-exposed individual" to "one-in-one million" (1×10^{-6}) or less.80/ Figure #21 illustrates what a "one in a million" risk entails. It is unclear whether these "interim" standards are even available for known human carcinogens81/ or whether the "interim" standards must be replaced, at some undefined time, by the apparently permanent "ample margin" standards.

It is evident, however, that the effect of these provisions would be to overrule the recent en banc decision in Vinyl Chloride holding that practical factors can be considered in establishing margins of safety under Section 112.82/ Moreover, these provisions would establish zero, or at least a very low risk threshold below one-in-one-million for the "most exposed" person, as the "acceptable risk" criterion for "ample margin of safety" standards.83/ Equally important, in contrast to EPA's current approach under Section 112, all sources of a HAP -- including, apparently, mobile sources -- would be subject to either "ample margin" or "interim" health-based standards under the bill.

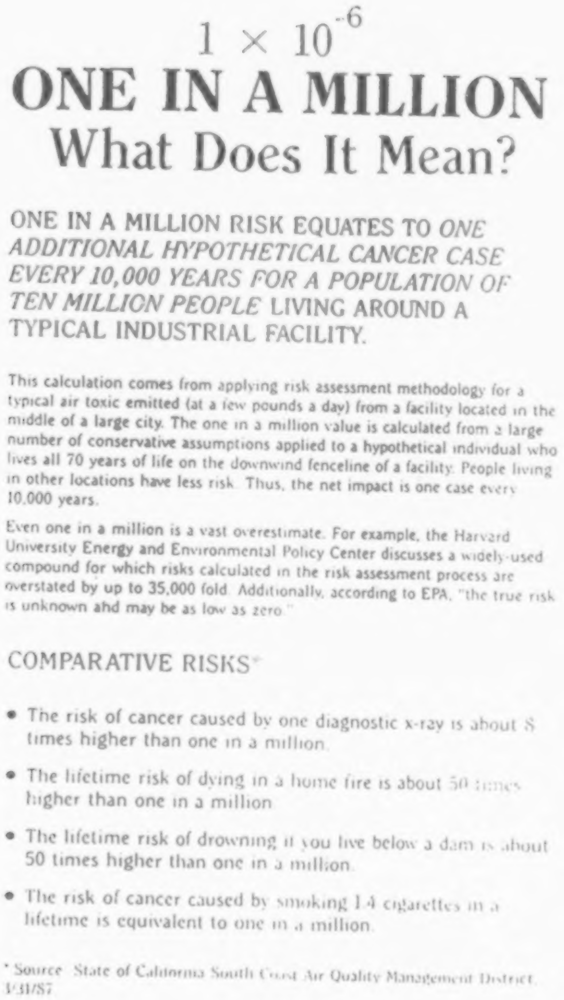
80/ The 1×10^{-6} risk target is assumed here to be a lifetime risk level, since that is EPA's current approach to evaluating the significance of the risk to nearby residents. If it means an annual risk, the lifetime risk equivalent would be around 7-in-100,000.

81/ The bill refers specifically to EPA's Cancer Risk Assessment Guidelines, which classify carcinogens into three groups: (A) Human Carcinogen, (B) Probable Human Carcinogen, (C) Possible Human Carcinogen. 51 Fed. Reg. 33992, 34000 (Sept. 24, 1986). If the terms "probable" and "possible" in the Bill are read to correspond with the EPA categories, Group A carcinogens might not qualify for "interim" standards.

82/ NRDC v. EPA, No. 85-1150 (D.C. Cir., Slip op. dated July 28, 1987) (en banc).

83/ If "interim" standards (which by definition under the bill provide "other than an ample margin of safety") must meet the one-in-one-million test, "ample margin" standards presumably must achieve even greater, if not absolute, health protection.

Figure #21: One-In-A-Million: What Does It Mean



1×10^{-6}

ONE IN A MILLION
What Does It Mean?

ONE IN A MILLION RISK EQUATES TO *ONE ADDITIONAL HYPOTHETICAL CANCER CASE EVERY 10,000 YEARS FOR A POPULATION OF TEN MILLION PEOPLE* LIVING AROUND A TYPICAL INDUSTRIAL FACILITY.

This calculation comes from applying risk assessment methodology for a typical air toxic emitted (at a few pounds a day) from a facility located in the middle of a large city. The one in a million value is calculated from a large number of conservative assumptions applied to a hypothetical individual who lives all 70 years of life on the downwind fenceline of a facility. People living in other locations have less risk. Thus, the net impact is one case every 10,000 years.

Even one in a million is a vast overestimate. For example, the Harvard University Energy and Environmental Policy Center discusses a widely-used compound for which risks calculated in the risk assessment process are overstated by up to 35,000 fold. Additionally, according to EPA, "the true risk is unknown ahd may be as low as zero."

COMPARATIVE RISKS*

- The risk of cancer caused by one diagnostic x-ray is about 8 times higher than one in a million.
- The lifetime risk of dying in a home fire is about 50 times higher than one in a million.
- The lifetime risk of drowning if you live below a dam is about 50 times higher than one in a million.
- The risk of cancer caused by smoking 1.4 cigarettes in a lifetime is equivalent to one in a million.

* Source: State of California South Coast Air Quality Management District, 1/31/87

The technology-based standards available for the eight-year delay period would required the "maximum" emission reduction "achievable," considering costs. In practical effect, however, this test would apply only to sources that have never been regulated by the States or EPA under the Clean Air Act. Other sources would be required to meet "the most stringent emission level that is achieved in practice" by any source within the source category, and "[in] no event" may the standard be less stringent than any new source performance standard (NSPS) or lowest achievable emission rate (LAER) applicable to the category.84/ Where applicable, these limits would be imposed whether or not they are technically or economically "achievable" for a particular source.

2. Title V and Current Law Compared

EPA's current approach to regulating these substances and the approach taken by the Committee bill are contrasted in Tables #22 - 25 on the following pages.

a. Cancer cases prevented

Of the eight pollutants listed by the Committee bill for regulation under health-based standards -- arsenic, asbestos, benzene, beryllium, coke oven emissions, mercury, radionuclides, and vinyl chloride85/ -- only six are currently regulated as car-

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84/ Title I of the Committee bill redefines LAER to be the average degree of emission reduction achieved by the upper decile (in terms of control) of all sources within the category. Thus, under the bill, LAER would become more stringent than it is in current law.

85/ All of which has been listed as HAPs under Section 112 of the Clean Air Act.

cinogens under section 112.86/

Table #22 displays EPA's estimates of the annual cancer incidences that remain under the Section 112 standards prescribed or proposed to date, including sources EPA has declined to regulate or has not yet addressed. With the exception of coke oven emissions (4 cases per year), EPA's program typically has reduced estimated cancer incidence of up to 2 cases per year per pollutant. For the six HAPs regulated as carcinogens, the total residual cancer incidence is 12 to 13 cases per year. To put this figure in perspective, there are about 450,000 deaths from cancer every year in the U.S.87/ Table #22 also identifies, for each of the six HAPs, the source categories that are estimated by EPA to pose lifetime **"maximum individual risks" (MIRs)** of 1×10^{-3} (one-in-1,000) or higher. There are eight such sources for all six HAPs, and six of the eight sources are arsenic (three) and radionuclides (three) emitters. It is important to bear in mind that EPA's approach to estimated MIRs admittedly produces an overestimate by a factor of ten or more,88/ and that the Agency typically has not developed estimates of how many people are exposed at or near the MIR level for particular sources. For additional perspective, the background individual lifetime risk of cancer in the U.S. is 0.165, or 165×10^{-3}.89/ Thus, an individual cancer risk of of 1×10^{-3} represents an increase of 0.6 percent over an individual's overall lifetime cancer risk.90/

86/ Beryllium and mercury are not.

87/ American Cancer Society, Cancer Facts and Figures (1984), p. 10.

88/ *See*, e.g., 48 Fed. Reg. 15076, 15084 col. 1 (Apr. 6, 1983).

89/ 49 Fed. Reg. 43906, 43910 col. 3 (Oct. 31, 1984).

90/ *Id*.

Table #22: Cancer Risks Remaining -- EPA Current Sec. 112

ESTIMATED CANCER RISKS
REMAINING UNDER EPA § 112 STANDARDS

POLLUTANT	ANNUAL CANCER INCIDENCE FROM BOTH REGULATED AND UNREGULATED SOURCES	SOURCES POSING MIRs OF 10^{-3} OR HIGHER
Inorganic Arsenic	1.7	Uncontrolled Primary Copper Smelters ($1x10^{-3}$) Primary Lead Smelters ($2x10^{-3}$) Zinc Oxide Plants ($1x10^{-3}$)
Asbestos	0.7-1.2	None
Benzene	2.8	Benzene Handling ($1x10^{-3}$)
Coke Oven Emissions	4.0	Wet-Coal Charged By-Product Coke Oven Batteries ($1x10^{-2}$)
Radionuclides	2.0-2.8	Underground Uranium Mines ($>1x10^{-3}$) Open-Pit Uranium Mines ($1x10^{-3}$) Elemental Phosphorous Plants ($1x10^{-3}$)
Vinyl Chloride	0.8	No estimate
TOTALS	12-13	8 sources $\geq 10^{-3}$

b. **Additional sources regulated**

Table #23 lists the sources of the six HAPs which EPA has studied and which pose MIRs above 10^{-6}. These sources presumably would be subject to new regulation under the Committee bill.91/ The list includes sources which are already subject to Section 112 standards and therefore may escape stricter controls under the Bill.92/ Needless to say, a sizeable amount of new emission controls is contemplated just for these pollutants.

Moreover, the impact will be far broader than Table #23 indicates, because only sources EPA has studied are listed there. Particularly for pervasive pollutants like radionuclides and benzene, many other stationary sources may be subject to new controls if, as the Committee bill provides, all sources are to be subject to standards. Perhaps equally important, Table #23 does not include additional mobile source HAPs standards that might be required under the Bill. For example, EPA has estimated that mobile sources are responsible for about 80 percent of current man-made emissions for one of the six HAPs (benzene).93/

91/ With the exception of non-boiler radionuclide sources which would be regulated "in accordance with section 112 of the Clean Air Act as in effect prior to the enactment of this Act." Radionuclide-emitting boilers would be subject to the technology regulations of Section 502 of the Committee bill.

92/ Section 510 of the Committee bill does provide that its amendments to Section 112 of the Clean Air Act "shall not affect any emission standard for a [HAP] which has been promulgated prior to the enactment of this Act." Depending on how this sentence is read, some of the source categories listed on Table 30, and comparable tables for other HAPs addressed in these views, might escape new regulation.

93/ See 49 Fed. Reg. 23478, 23488-89 (June 6, 1984).

Table #23: Additional HAP Sources Regulated by Title V

ADDITIONAL HAPS SOURCES
REQUIRED TO BE REGULATED UNDER TITLE V

ARSENIC

- ASARCO Primary Copper Smelter ($8x10^{-4}$)*
- Unregulated Primary Copper Smelters ($1.8x10^{-3}$)
- Glass Mfg. Plants ($9x10^{-4}$)
- Primary Lead Smelters ($2x10^{-3}$)
- Secondary Lead Smelters ($4x10^{-4}$)
- Primary Zinc Smelters ($7x10^{-6}$)
- Zinc Oxide Plants ($1x10^{-3}$)
- Cotton Gins ($5x10^{-4}$)
- Arsenic Chemical Plants ($2x10^{-4}$)

BENZENE

- Fugitive Emissions ($5x10^{-4}$)*
- Coke By-Product ($4x10^{-4}$)
- Refueling Emissions ($2x10^{-6}$)
- Maleic Anhydride ($1x10^{-6}$)
- EB/S Plants ($1x10^{-4}$)
- Storage Vessels ($4x10^{-4}$)
- Stage I Gas. Mktg. ($1x10^{-4}$)
- Ethylene Plants ($3x10^{-5}$)
- Nitrobenzene Plants ($5x10^{-5}$)
- Chlorobenzene Plants ($2x10^{-5}$)
- Linear Alkyl Benzene ($1x10^{-4}$)
- Benzene Handling ($1x10^{-3}$)

VINYL CHLORIDE

- PVC Fabricators (?)
- Miscellaneous Sources (?)
- Rail and Tank Cars and Marine Unloading (?)
- Storage Facilities (?)
- Disposal Facilities (?)

ASBESTOS

- Milling ($4x10^{-5}$)
- Product Mfg. ($3x10^{-3}$)
- Product Fabrication ($2x10^{-4}$)
- Demolition ($2x10^{-5}$)*

COKE OVEN EMISSIONS

- Wet-Coal Charged By-Product Coke Oven Batteries ($1x10^{-2}$)

RADIONUCLIDES

- DOE Facilities ($8x10^{-4}$)
- NRC-Licensed and non-DOE Federal Facilities ($2x10^{-4}$)
- Coal-Fired Utility Boilers ($3x10^{-5}$)
- Copper Mining ($4x10^{-5}$)
- Zinc Mining ($2x10^{-4}$)
- Lead Mining/Smelting ($2x10^{-4}$)
- Underground Uranium Mines ($>1x10^{-3}$)
- Open-Pit Uranium Mines ($1x10^{-3}$)
- Uranium Mill Tailings (?)*
- Phosphate Mining ($3x10^{-4}$)
- Phosphate Rock Processing ($1x10^{-5}$)
- Elemental Phosphorous Plants ($1x10^{-}$
- Phosphogypsum Piles ($8x10^{-4}$)
- Underground Drinking Water Treatment Plants ($1x10^{-5}$)

*Sources marked with an asterisk are already subject to § 112 standards.

Table #24 summarizes the EPA estimates presented later in these views on the costs and effectiveness of the controls (typically NSPS, LAER, or less stringent limits) the Agency has refused to require for various sources of the six HAPs.94/ These figures provide a rough measure of the costs and effectiveness of the eight-year "technology-based" standards under the Committee bill.

Table #24 also reveals that these standards would achieve only very small reductions in estimated cancer incidence. Nevertheless, the annual cost of these standards would be over $4 billion for four of the pollutants, not counting the substantial additional economic costs from widespread closure of coke oven batteries. The $4 billion per year figure understates the cost of the Committee Bill by a considerable margin, because it covers only 19 sources of the 45 listed in Table #23. If the effects on the other 26 sources are proportionate in terms of cost, the total annual cost would be about $10 billion or more. The costs would be much higher if there is a large number of sources of these HAPs which have not been evaluated by EPA or if additional mobile source controls were required.

Moreover, this $10 billion/year figure applies only to the six carcinogenic HAPs that would automatically be listed under the Committee Bill. If other pollutants were listed as HAPs by EPA after enactment, the costs could increase dramatically. For example, EPA already has declared its intent to list ten additional pollutants as HAPs under Section 112 of the current law.95/

94/ Vinyl chloride sources are not listed in Table 24 because comparable EPA estimates for that pollutant are not readily available.

95/ *See* Table 20. These pollutant are: chromium, carbon tetrachloride, ethylene oxide, chloroform, ethylene dichloride, cadminium, 1-3-butadiene, methylene chloride, perchloroethylene, and trichloroethylene.

Table #24: Cost and Effectiveness of Rejected Controls

COSTS AND EFFECTIVENESS OF
AVAILABLE CONTROLS REJECTED BY EPA
AS UNNECESSARY OR TOO COSTLY

	ANNUAL INCIDENCE REDUCTION				
POLLUTANT	LEAST EFFECTIVE CONTROL	MOST EFFECTIVE CONTROL	TOTAL FOR ALL REJECTED CONTROLS	TOTAL ANNUAL COSTS FOR REJECTED CONTROLS (MILLIONS OF $$)	COST PER CANCER AVERTED FOR ALL REJECTED CONTROLS (MILLIONS OF $$)
Arsenic (4 sources)	0.001	0.124	0.2	69	290
Asbestos (4 sources)	0.004	0.71	0.4-1.0	79	77-192
Benzene (6 sources)	0.006	0.2	0.3-0.4	137	351-428
Coke Oven Emissions	--	--	3.1	*	*
Radionuclides (5 sources)	0.00004	0.2-0.4	0.3-0.8	3,970-4,150	5,000-14,000
TOTALS*			1.2-2.4	4,255-4,435	1,800-3,700

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*EPA predicts widespread closures under this "LAER-based" control option and capital costs ranging up to $5 billion. Because an EPA annualized cost estimate was not available, estimates of incidence reduction and cost-per-cancer-averted for coke oven emissions are not included in the TOTAL.

The HAPs provisions may well reflect just the "tip of the iceberg" as a measure of the economic impact of Title V of the Committee bill. Completely apart from the HAPs program, the bill could impose similar technology-based standards on many stationary and mobile sources that emit 224 other pollutants. Even if only one category of sources would be subject to control for each of these pollutants, Title V of the bill could cost about $61 billion per year, more than twice as much as the nation is already spending on all air pollution abatement.96/ If anything, the eventual costs of Title V are likely to be far higher than this, since EPA's experience under the HAPs program indicates that there are typically ten or more significant emission sources for each pollutant regulated.97/

c. Government and private resources expended

Table #24 also suggests that the Committee bill's standards would involve very inefficient resource expenditures compared to other federal health regulations. Without placing a monetary value on human life, federal regulators must still look to the cost of adverse health effects prevented by a proposed regulation in order to ensure that finite government and private sector resources are

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96/ Assuming the annual cost per source for these new technology-based standards is about the same as the average annual cost of the NSPS- or LAER-type control EPA rejected for four HAPs ($4.3 billion/year divided by 19 sources = $226 million per year per source -- see Table 24), the annual cost of controlling 224 additional sources would be (224 x $226 million/year =) $51 billion. Add to that the $10 million potential cost of Section 503.

97/ For the six HAPs listed under section 503 which have been found to be carcinogens, the number of major sources EPA evaluated were: 9 for arsenic; 10 for asbestos; 12 for benzene; 1 for coke oven emissions; over two dozen for radionuclides; and 7 for vinyl chloride.

used effectively to obtain the greatest health benefits possible. For cancer reducing measures, regulations costing $3 to 10 million per cancer averted are regarded as reasonably cost-effective.[98] As indicated in Table #24, controls likely to be required under the Committee bill would cost about $2 to 4 **billion** per cancer averted, and thus would be 1,000 to 10,000 times more expensive than measures considered reasonable by regulators today.

Another perspective on the cost-effectiveness of the Committee Bill "technology-based" standards can be drawn from the 1985 EPA Air Toxics Study. If controls of the efficiency indicated in Table #24 were extended in an effort to eliminate the 1,300 to 1,700 cancers per year EPA projects for air toxics, the total expenditure would be **$3 to 5 trillion.** That would be the equivalent of spending the entire Federal Budget (currently around $1 trillion[99] for the next three to five years on air toxics alone, leaving all other national priorities unaddressed. **Even then, we would be reducing the annual cancer death rate by less than 0.04 percent.**

The preceding figures address only a relatively small part of the impact of the HAPs provisions of Title V, since they deal only with the temporary technology-based standards. Within eight years of promulgation, most sources of HAPs would have to meet health-based standards that, at a minimum, would reduce MIRs to 10^{-6} or lower.

EPA's analyses do not supply the data needed to estimate the additional costs of achieving these even stricter emission limits at all the additional HAPs sources that would have to be controlled. There is one example, however, that deserves mention. In the case of gasoline marketing sources, EPA figures indicate that even the combination of refueling control, Stage I controls, and an 81 percent reduction in the benzene content of gasoline would not reduce all gasoline marketing MIRs to 10^{-6}. Nevertheless, the cost of this combination of controls would be about $19 to 22 billion per year.

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[98] 52 Fed Reg. 31184 col. 2

[99] Office of Management and Budget, The Budget of the United States in Brief -- Fiscal Year 1988 (1987), p. 15.

d. National industry lost

More apparent is the conclusion that, for many sources of these six HAPs, even the most stringent "available" controls evaluated by EPA would not reduce MIRs to 10^{-6}, at least under the Agency's current "worst-case" approach for estimating the MIR. Table #25 lists these sources, as well as others for which EPA has not estimated the MIRs achievable under stricter controls. In the latter group, most sources would be required to reduce current emissions by substantially more than a factor of ten to reach 10^{-6}.

Consequently, unless feasible controls far more effective than those studied by EPA are identified, or a more realistic approach to estimating MIRs is adopted,100/ the Committee bill's 10^{-6} MIR test would result in many plant or industry closures. Moreover, the bill might be read to require these HAPs sources to meet, either immediately after the expiration of the eight-year technology-based standards or at some undefined later time, "ample margin of safety" standards that would reduce emissions to zero or at least a level

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100/ Some sources listed on Table 25 might not be regulated if EPA developed a more realistic risk assessment for estimating "maximum risk," and still more sources might drop off the list if consideration were given the size of the populations exposed at or near the "maximum" concentration.

Table #25: HAP Sources Unable to Achieve 10^{-6} MIR

HAPS SOURCES UNABLE TO
ACHIEVE A 10^{-}[illegible] MIR USING
THE MOST STRINGENT CONTROLS
EVALUATED BY EPA

POLLUTANT	ACHIEVABLE MIR 1/	SOURCES NOT EVALUATED BY EPA 2/
Arsenic	Unregulated Primary Copper Smelters (1x10^{-}[illegible]) Unregulated Glass Mfg. Plants (1x10^{-}[illegible])	Primary Lead Smelters (2x10^{-}[illegible]) Secondary Lead Smelters (4x10^{-}[illegible]) Primary Zinc Smelters (7x10^{-}[illegible]) Zinc Oxide Plants (1x10^{-}[illegible]) Cotton Gins (5x10^{-}[illegible]) Arsenic Chemicals (2x10^{-}[illegible])
Asbestos	Demolition Activities (1x10^{-}[illegible])	
Benzene	Fugitive Benzene (5x10^{-}[illegible]) Coke By-Product (3x10^{-}[illegible]) Maleic Anlydride (1x10^{-}[illegible]) EB/S (1x10^{-}[illegible]) Benzene Storage (3x10^{-}[illegible]) Gas Marketing (4x10^{-}[illegible])	Ethylene Plants (3x10^{-}[illegible]) Nitrobenzene Plants (5x10^{-}[illegible]) Chlorobenzene Plants (2x10^{-}[illegible]) Lin Alk. Bz. Plants (1x10^{-}[illegible]) Benzene Handling (1x10^{-}[illegible])
Coke Oven Emissions	Wet-Coal Charged By-Product Coke Oven Batteries (3x10^{-}[illegible])	
Radionuclides	Underground Uranium Mines (1x10^{-}[illegible]) Coal Fired Utility Boilers (?) Phosphate Rock Processing (4x10^{-}[illegible]) Elemental Phosphorous Plants (5x10^{-}[illegible]) DOE Facilities (4x10^{-}[illegible]) Uranium Mills (?)	NRC-Licensed Test Reactors (2x10^{-}[illegible]) Lg. Radiopharmacheuticals Mfrs. (6x10^{-}[illegible]) Underground Copper Mines (4x10^{-}[illegible]) Open-Pit Copper Mines (3x10^{-}[illegible]) Zinc Mines (2x10^{-}[illegible]) Lead Mines/Smelters (8x10^{-}[illegible]) Phosphogypsum Piles (8x10^{-}[illegible]) Open-Pit Uranium Mines (1x10^{-}[illegible]) Phosphate Mining (3x10^{-}[illegible]) Underground Drinking Water Treatment Plants (1x10^{-}[illegible])

1/ The MIR estimate in parentheses is the level achievable by the most stringent emission controls evaluated by EPA.

2/ The MIR estimate in parentheses is the level under current controls.

stricter than the 10^{-6} MIR test for "interim" health based standards. In that event, few if any of the sources listed on Tables #23 and #25 could continue to operate.

3. Sample Impacts of Title V on Specific Sources

The preceding comparison of EPA's current air toxics program and the Committee bill's approach is made clearer by examining the specific benefits, feasibility, and economic impacts of each. This section of the Minority views compares how current law and Title V differ in addressing just five of the HAPs specifically to be regulated under section 503 of the Committee bill.101/ The following questions are addressed in each discussion:

- How much risk remains under EPA's current approach to setting Section 112 standards?
- What sources not currently regulated would be subject to standards under the Mitchell bill?
- Are the eight-year technology-based standards of the Committee bill for all or some sources and, if so, what would be their benefits and costs?
- Would the "interim" health-based standards of the Committee bill (i.e. one-in-a-million maximum risk) be feasible for all or some sources and, if so, what would be their benefits and costs?

101/ The discussion focuses on the four hazardous air pollutants which the Administrator must regulate under the health-based standards (arsenic, asbestos, benzene, and vinyl chloride), and "coke-oven emissions," which the Administrator may regulate under health-based standards.

a. Arsenic

EPA's 1986 Inorganic Arsenic Standard102/ prescribes new controls for three source categories: primary copper smelters, glass manufacturing plants, and arsenic trioxide/metallic arsenic plants. The coverage of these standards is actually quite limited. The standard for primary copper smelters requires new controls on one smelter (of fourteen); the standard for glass manufacturing would require controls on two of the existing 75 glass furnaces using arsenic; and the third standard affects one facility.103/ In addition, EPA declined to set Section 112 arsenic standards for six source categories: (a) primary lead smelters (5 plants); (b) secondary lead smelters (35 plants); (c) primary zinc smelters (5 plants); (d) zinc oxide plants (2 plants); (e) cotton gins (300 plants); and (f) arsenic chemical manufacturing plants (8 plants).104/

Despite the limited coverage of the arsenic standards, the risks posed by unregulated sources are characterized by EPA as small or reasonable in view of the costs and impacts of further control. Table #26 contains EPA's risk estimates for both regulated and unregulated arsenic sources. The total annual incidence projected for all sources is about 1.7 cases per year. Nearly 60 percent of this total (0.96 cases per year) are from primary copper smelters, where EPA found that stricter standards would result in significant plant closures.105/ The MIR estimates range from 5×10^{-6} to

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102/ 51 Fed. Reg. 27956 (Aug. 4, 1986)

103/ *Id.* at 27970 col. 3; 27995 cols. 2-3 & 27997 col. 2; 28006 cols. 2-3.

104/ *Id.* at 28014 col. 2.

105/ *Id.* at 27975 col. 1.

Table #26: Cancer Risks Remaining -- EPA Arsenic Standard

CANCER RISKS REMAINING
UNDER EPA'S ARSENIC STANDARD 1/

	SOURCE	ANNUAL INCIDENCE	MAX. IND. RISK
A.	Regulated Sources		
1.	ASARCO-El Paso Primary Copper Smelter	0.29	8×10^{-4}
2.	Glass Mfg.	0.025	5×10^{-5}
3.	Arsenic Trioxide/ Metallic Plants	(no estimate)	(no estimate)
B.	Unregulated Sources		
4.	Uncontrolled Primary Copper Smelters	0.67	from 5×10^{-6} to 1.3×10^{-3}
5.	Uncontrolled Glass Mfg. Plants	0.148	from 3×10^{-5} to 9×10^{-4}
6.	Primary Lead Smelters	0.07	2×10^{-3}
7.	Secondary Lead Smelters	0.39	4×10^{-4}
8.	Primary Zinc Smelters	0.004	7×10^{-6}
9.	Zinc Oxide Plants	0.08	1×10^{-3}
10.	Cotton Gins	Negligible	5×10^{-4}
11.	Arsenic Chemical Plants	0.004	2×10^{-4}
C.	TOTALS	1.681	from 5×10^{-6} to 2×10^{-3}

1/ Source: 51 Fed. Reg. 27956 (Aug. 4, 1986)

1.3×10^{-3}. As the Agency points out at various places in the Arsenic Preamble, MIRs above 1×10^{-3} are unusual for arsenic sources and occur at plants that are already well-controlled (two primary copper smelters, one primary lead smelter).106/

An examination of the available controls rejected by EPA for these unregulated sources can provide a measure of the benefits and costs of the technology-based standards envisioned by the Committee bill. For example, the secondary converter controls EPA declined to impose on thirteen of the fourteen primary copper smelters would have reduced the estimated annual incidence from 0.67 to 0.569 cases per year, thus preventing about 0.1 cases per year, or about one case every ten years.107/ The costs of imposing these controls were estimated to be $29 million per year,108/ which implies an expenditure of $290 million for each case of cancer averted. The controls would have lowered the upper end of the MIR range for these sources from 1.3×10^{-3} to 1.2×10^{-3}.109/ Two of the remaining fourteen copper smelters were predicted to close under this option.110/

Similarly, EPA considered and rejected secondary controls on matte and slag tapping operations for these smelters, which would have cost $5.5 million per year and were estimated to prevent 0.001 cancers per year, or one case every 1,000 years.111/ These figures

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106/ See Id. at 27973, 28022 col. 3.

107/ 51 Fed. Reg. at 27974 (Table III-3).

108/ Id. at 27973 (Table III-1).

109/ Id. at 27974 (Table III-1).

110/ Id. at 27975 col. 1.

111/ Id. at 27973 (Table III-2) & 27975 col. 2.

imply an expenditure of $5.5 billion for each cancer averted, a relatively high cost especially for controls that would not have changed the primary copper smelter MIR for arsenic.**112**/ EPA also rejected for six smelters a proposed "gas cooling" control approach that theoretically might eliminate some types of arsenic emissions, but would avert a maximum of 0.012 cancers per year (one every 83 years) at a minimum cost of $32.1 million per year, implying a cost of $2.7 billion per cancer averted.**113**/

Comparable results apply for glass manufacturing plants. According to EPA figures, extending the arsenic/glass manufacturing standard to unregulated facilities would prevent 0.122 cancers per year (one every eight years), at a cost of $2.5 million per year.**114**/ The implied expenditure per cancer averted is thus nearly $21 million. The MIRs for these plants would have been lowered from (i) up to 9.0×10^{-4} at present, to (ii) up to 1.7×10^{-4} under new controls.**115**/

The Arsenic Preamble does not provide similar cost estimates for the six other categories of arsenic sources EPA declined to regulate. In each of these cases, EPA found that either no feasible technologies for further control were available, or that any such technologies would not significantly reduce existing risks.**116**/ There are indications, however, both in the Arsenic Preamble and

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112/ *Id*. at 27975 col. 2.

113/ *Id*. at 27984-85.

114/ *Id*. at 27995-96 (Tables IV-3, IV-4).

115/ *Id*. at 27996 (Table IV-4).

116/ *Id*. at 28019-20; 28020-21; 28022-23; 28023 col. 2; 28024 col. 1.

elsewhere,117/ that there are available controls for these sources which might be required to qualify for the eight-year grace period of the Committee bill.

The preceding cost-per-cancer-averted estimates for imposing additional controls on arsenic sources are high by comparison to EPA's previous regulatory decisions under Section 112. This can be illustrated by the Arsenic Standard itself. As shown in Table #27, the standard for primary copper smelters is projected to prevent 0.09 cancers per year at an annual cost of $379,000, for an implied expenditure of $4.2 million per cancer averted.118/ Likewise, the glass manufacturing controls required under the standard are estimated to prevent 0.21 cancers per year at an annual cost of $1.064 million, or about $5 million per cancer averted.119/ In contrast, the per-case-averted costs of the arsenic controls EPA rejected range from $21 million to $5.5 billion.

Lastly, as shown in Table #28, the controls evaluated in the Arsenic Preamble would not achieve the 10^{-6} MIR "interim" standard for any of the arsenic source categories for which EPA studied the effectiveness of further control.120/ Moreover, since the MIRs are above 10^{-4} for all but one of the other six sources, it is quite possible that these sources,

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117/ Id. at 28018 col. 3, 28019-20; see also EPA, Preliminary Study of Sources of Inorganic Arsenic (EPA - 450/5-82-005, August 1982) (providing "estimated best control" emission levels for each of these categories).

118/ 51 Fed. Reg. at 27970 col. 3, 27971 col. 1.

119/ Id. at 27995-96 (Tables IV-3 and IV-4).

120/ "Gas-cooling" controls would theoretically eliminate arsenic emission for only one emission point for the six primary copper smelters in which it could be used, and EPA in any event rejected this control as infeasible. Id. at 27985 col. 2.

Table #27: Costs and Effectiveness of Arsenic Controls

COSTS AND EFFECTIVENESS OF ARSENIC CONTROLS 1/

	SOURCE	ANNUAL INCIDENCE REDUCTION	ADDITIONAL ANNUAL COSTS (MILLIONS OF $$)	COST PER CANCER AVERTED (MILLIONS OF $$)
A.	Required Controls			
	Primary Copper Smelter	0.09	0.379	4.2
	Glass Mfg.	0.21	1.064	5.07
B.	Rejected Controls			
	Secondary Converter Controls on Unregulated Primary Copper Smelters	0.1	29.0	290
	Matte and Slag Tapping Controls for Primary Copper Smelters	0.001	5.5	5,500
	Gas Cooling for Some Primary Copper Smelters	0.012	32.1	2,700
	Coverage of Unregulated Glass Mfg. Plants	0.122	2.542	20.8
	TOTALS FOR REJECTED CONTROLS	0.236	68.7	291

1/ Source: 51 Fed. Reg. 27956 (Aug. 4, 1986).

Table #28: Effectiveness of Arsenic Controls in Reducing MIRs

EFFECTIVENESS OF ARSENIC CONTROLS IN REDUCING MAXIMUM INDIVIDUAL RISKS 1/

A. Sources for Which New Controls Were Evaluated

SOURCE	PRE-CONTROL MIR	RESIDUAL MIR AFTER CONTROL
Secondary Converter Controls on Unregulated Primary Copper Smelters	1.3×10^{-3}	1.2×10^{-3}
Matte and Slag Tapping Controls for Primary Copper Smelters	1.2×10^{-3}	1.2×10^{-3}
Coverage of Unregulated Glass Mfg. Plants	9×10^{-4}	1.7×10^{-4}

B. Sources for Which New Controls Were Not Evaluated

SOURCE	CURRENT MIR
Primary Lead Smelters	2×10^{-3}
Secondary Lead Smelters	4×10^{-4}
Primary Zinc Smelters	7×10^{-6}
Zinc Oxide Plants	1×10^{-3}
Cotton Gins	5×10^{-4}
Arsenic Chemical Plants	2×10^{-4}

1/ Source: 51 Fed. Reg. 27956 (Aug. 4, 1986) too, would be unable to achieve the Committee bill's 10^{-6} MIR limit without widespread closures. Consequently, unless other more effective controls are identified or developed, **no significant arsenic emitting source could continue to operate (at least at current production levels) once the Committee bill's eight-year grace period expires.**

b. **Asbestos**

As the Agency's latest review of the current Section 112 Asbestos Standard121/ reveals, EPA's Section 112 program, in combination with other regulations, has been strikingly effective in reducing emissions and public health risks. Nationwide asbestos emissions have been reduced from an uncontrolled level of about 40.8 million kilograms per year [kg/yr] to a best estimate of less than 6,000 kg/yr under the current standard, for a reduction of over 99.9 percent.122/ As a result of these emission reductions, public health risks from airborne asbestos have declined dramatically. In terms of estimated cancer incidence, the risks have fallen from 2,100 - 3,900 cases per year at uncontrolled levels, to 0.68-1.2 cases per year under full compliance with the EPA Section 112 asbestos standard.123/ Similarly, at uncontrolled emissions MIRs for

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121/ EPA, National Emission Standards for Asbestos -- Background Information for Proposed Standards (Draft, July 15, 1986) ["Asbestos Background Document"].

122/ Id. at p. 3-50. Not all of the reduction is attributable to the EPA section 112 standard; other reasons for the decline include OSHA, MSHA and State regulations as well as voluntary controls.

123/ Id. at p. A-35.

many sources were at 10^{-1} or even higher, but MIRs under the standard range from 10^{-3} to 10^{-9}, with all but two categories below 10^{-4}.124/ See Table #29.

Nevertheless, because the MIRs for many asbestos source categories exceed 10^{-6}, the existing asbestos standard would be too lax under the Committee bill because it does not satisfy the test for even an "interim" standard.125/ Among the source categories which would need stricter controls are the following:

* asbestos mines and mills
* primary asbestos product manufacturing facilities, including
  - asbestos paper
  - friction materials
  - asbestos-cement products
  - vinyl asbestos floor tile
  - coatings and sealants
  - gaskets and packings
  - textiles
* secondary fabricating plants
* demolition projects involving asbestos-containing building materials

The Asbestos Background Document evaluates in detail a single additional control option for these sources (a high-efficiency filter for collecting emissions), which presumably would be required to qualify for the eight-year grace period of the Committee bill.

124/ Id. at p. A-36.

125/ Again, it must be noted that Section 510 does provide that the bill "shall not affect any emission standard for a [HAP] which has been promulgated prior to the enactment of this Act."

Table #29: Asbestos Health Risks

ASBESTOS HEALTH RISKS 1/

	ANNUAL INCIDENCE		MIR	
SOURCE	PRE-NESHAP	NESHAP	PRE-NESHAP	NESHAP
Milling				
Production	31-34	0.0043-0.0048	2.5×10^{-1}	3.5×10^{-5}
Waste Disposal	0.0055	Negligible	3.9×10^{-5}	5.5×10^{-9}
Manufacturing				
Production	1700-2800	0.25 - 0.71	1.0	3.2×10^{-3}
Waste Disposal	0.18	Negligible	1.8×10^{-2}	2.6×10^{-6}
Fabrication				
Production	220-920	0.046 - 0.20	1.0	2.1×10^{-4}
Waste Disposal	0.011	Negligible	3.1×10^{-5}	6.5×10^{-9}
Demolition				
Production	0.6	0.25	5.3×10^{-5}	2.2×10^{-5}
Waste Disposal	180	0.13	1.6×10^{-1}	1.2×10^{-5}
Renovation				
Production	0.0046	0.0032	4.0×10^{-7}	2.8×10^{-7}
Waste Disposal	0.49	0.0007	4.3×10^{-5}	6.2×10^{-8}
TOTALS	2100-3900	0.68-1.2	from 4×10^{-7} to 1.0	from 5.5x10 to 3.2×10^{-3}

1/ Source: EPA, National Emission Standards for Asbestos -- Background Information for Proposed Standards (Draft, July 15, 1986).

This control is projected to cost $37.4 million per year in asbestos milling, manufacturing and fabrication operations, and $41.5 million/year in demolition, for a total of $78.9 million/year.126/ See Table #30. Significant plant closures and job losses are not projected, but only on the assumption that existing facilities can and will convert to the manufacture of non-asbestos products.127/

In terms of risk-reduction benefits, this stricter control would reduce estimated annual cancer incidence by 0.41 - 1.02 cases.128/ The resulting cost per cancer averted, $77 to $192 million, would be deemed excessive in comparison to most federal health-regulatory decisions. This control, however, would reduce the MIRs to below 10^{-6} for all source categories save one.129/ In the demolition category, additional controls beyond that evaluated by EPA would be needed to reduce the MIR by an additional factor of 10. If such controls are unavailable or infeasible, many existing buildings that contain asbestos materials might have to be abandoned. EPA estimates that there are over 26 million such structures.130/ Also affected would be ships, refineries, and power plants, which EPA estimates are dismantled at the rate of nine, four, and four per year, respectively.131/

126/ Asbestos Background Document at p. 8-3.

127/ *Id*. at p. 8-60.

128/ *Id*. at p. A-35.

129/ *Id*. at p. A-36.

130/ *Id*. at p. 8-29.

131/ *Id*. at pp. 8-31 to 8-32.

Table #30: Costs and Effectiveness of Asbestos Source Controls

COSTS AND EFFECTIVENESS OF
INCREASED CONTROLS ON ASBESTOS SOURCES 1/

SOURCE	ANNUAL INCIDENCE REDUCTION	ANNUAL COSTS	RESIDUAL MIR
Milling			
Production	0.0043-0.0048	(see below)	Negligible
Waste Disposal	Negligible		NA
Manufacturing			
Production	0.25 - 0.71	(see below)	Negligible
Waste Disposal	Negligible		NA
Fabrication			
Production	0.046 - 0.20	(see below)	6.3×10^{-8}
Waste Disposal	Negligible		NA
Demolition			
Production	0.11	(see below)	1.2×10^{-5}
Waste Disposal	Negligible		NA
Renovation			
Production	0.0004	(see below)	2.5×10^{-7}
Waste Disposal	Negligible		NA
TOTALS	0.41 - 1.02	$78.9 million	
		Cost Per Cancer Averted:	
		$77-192 million	

1/ Source: EPA, National Emission Standards for Asbestos -- Background Information for Proposed Standards (Draft, July 15, 1986).

c. **Benzene**

In contrast to the other HAPs EPA has addressed under Section 112, the Agency has not yet taken a position on all the significant categories of stationary sources of benzene emissions. To date, EPA has: (i) adopted a standard for fugitive benzene emissions from refineries and chemical manufacturing plants[132]; (ii) proposed a standard for benzene emissions from coke by-product recovery plants[133]; (iii) proposed a standard for vehicle refueling emissions[134]; and (iv) issued final decisions declining to set standards for maleic anhydride plants, ethylbenzene/styrene (EB/S) plants, and benzene storage vessels.[135] A variety of benzene-emitting sources remain unaddressed by EPA, including so-called "Stage I" emissions during gasoline marketing operations upstream of vehicle refueling,[136] as well as "benzene handling" operations and various chemical manufacturing sources such as ethylene, chlorobenzene, nitrobenzene, and linear alkyl benzene plants.[137]

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[132] 49 Fed. Reg. 23498 (June 6, 1984).

[133] 49 Fed. Reg. 23522 (June 6, 1982).

[134] 52 Fed. Reg. 31162 (Aug. 19, 1987).

[135] 49 Fed. Reg. 23558 (June 6, 1984).

[136] These sources are addressed in EPA, Evaluation of Air Pollution Regulatory Strategies for Gasoline Marketing Industry (EPA/450-3-84-012a, July 1984) ["Gasoline Marketing Analysis"].

[137] EPA Memorandum entitled "Priorities for Regulating Benzene-Emitting Sources Under Section 112 of the Clean Air Act" (April 1979) ["1979 Benzene Priorities Memo"]. The estimates in this EPA memorandum, which are based on 1978 emissions data and crude exposure modelling, may well be out of date and inaccurate by EPA standards.

Assuming that the pending proposals are adopted, EPA will have addressed about 75 percent of all stationary source emissions of benzene. EPA has stated that total stationary source emissions are 55,000 megagrams (Mg) per year.138/ The sources EPA has evaluated to date in the form of standards, proposed standards, or decisions not to regulate, are responsible for pre-control emissions totaling about 40,240 Mg/yr.139/

The estimated risks remaining under the decisions made to date, including the sources not yet formally addressed, appear in Table #31.140/ According to EPA's estimates, less than three cancers per year are projected to occur due to unregulated benzene emissions. Two of these, however, are the residual risks remaining after full implementation of the pending refueling emissions proposal, and the only way to reduce that risk significantly would be to place limits on the benzene content of gasoline. The sources EPA has not yet evaluated for Section 112 regulation are projected (based on dated information) to cause 0.23 cancer per year (about one every four years). Except for "benzene handling" -- a category that has not been clearly defined by EPA -- all MIRs are below 10^{-3}.

A number of the benzene decisions EPA has made thus far supply more clues on the costs and effectiveness of the Committee bill. In

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138/ See 49 Fed. Reg. 23478, 23478 col. 2 (June 6, 1984); see also "Fact Sheet on EPA's Intention to Regulate Benzene Under Section 112 (NESHAPS) of the Clean Air Act," (Dec. 16, 1983) at p. 2 ["1983 Benzene Fact Sheet"].

139/ See Benzene Listing Decision, 49 Fed. Reg. at 23492; Benzene Coke By-Product Proposal, 49 Fed. Reg. at 23525 col. 1; Gasoline Marketing Analysis at p. 2-19.

140/ The risk estimates cited on Table 31 and throughout this section are drawn from the sources cited previously, but have been revised where appropriate to reflect EPA's most recent unit risk factor estimate for benzene. See 50 Fed. Reg. 34144 (Aug. 23, 1985).

Table #31: Cancer Risks Remaining -- EPA Benzene Decision

CANCER RISKS REMAINING UNDER EPA'S BENZENE DECISIONS TO DATE

	SOURCE	ANNUAL INCIDENCE	MAX. IND. RISK
A.	Regulated Sources		
	1. Fugitive Emissions	0.17	5.3×10^{-4}
	2. Coke By-Product (Proposed)	0.22	3.5×10^{-4}
	3. Refueling Emissions (Proposed)	2.0	1.9×10^{-6}
B.	Sources Not Subject to Section 112 Standards		
	4. Maleic Anhydride	0.005	1.4×10^{-6}
	5. Ethylbenzene/Styrene	0.0067	1.6×10^{-4}
	6. Storage Vessels	0.05-0.11	$0.42\text{-}4.2 \times 10^{-4}$
C.	Sources Not Yet Evaluated for Section 112 Control		
	7. Stage I Gas. Mktg.	0.21	1.4×10^{-4}
	8. Ethylene Plants	0.01	2.5×10^{-5}
	9. Nitrobenzene Plants	0.02	5.4×10^{-5}
	10. Chlorobenzene Plants	0.002	2.4×10^{-5}
	11. Linear Alkyl Benzene Plants	0.05	9.6×10^{-5}
	12. Benzene Handling	0.07	1.4×10^{-3}
D.	TOTALS	2.8	from 1.4×10^{-6} to 1.4×10^{-3}

setting the Benzene Fugitive Emissions Standard, EPA declined to require dual mechanical seal systems on refinery and chemical plant pumps in benzene service. These controls, which would probably meet the Committee bill criteria for technology-based standards, were projected to avert an additional 0.01 cancers per year (one every one hundred years), at an annual cost of $3.3 million.141/ The implicit cost per case of cancer averted is $330 million. These controls would have reduced the MIR from 5.3 to 5.0 x 10^{-4}.142/ EPA also rejected a requirement to use sealed bellows valves on equipment in benzene service for essentially the same reason.143/ These controls, too, might well satisfy the Committee bill test for technology-based standards. These two additional controls would have increased the annual costs of the standard by a factor of 130, from $400,000 to $52.3 million.144/

Likewise, in the case of coke by-product recovery plants the Agency rejected a series of additional control measures that, taken together, would have increased the annual cost of the proposed standard by about $44.5 million.145/ The Agency's analysis of a substantial subgroup of these controls indicated that they would

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141/ 49 Fed. Reg. at 23509 col. 3.

142/ Id.

143/ Although it did not supply risk reduction data, EPA found that dual mechanical seals would cost $15,000 per Mg benzene reduced, and that sealed bellows valves were even "less cost-beneficial" (id. at 23509 col. 2), costing $44,000/Mg. Id. at 23508 col. 2.

144/ Id. at 23508 col. 2.

145/ 49 Fed. Reg. at 23535-36. The rejected controls included: wash-oil fuel coolers for naphthalene processing; gas blanketing for storage tanks containing benzene, light-oil, or ammonia liquor; dual mechanical seal systems; sealed bellows valves; and degassing reservoir vents and monthly inspections for exhausters. (Id. at 23536).

avert an additional 0.22 cancers per year over and above the proposed standard (about one every four to five years) at an added annual cost of $37.5 million.146/ The MIR would have been reduced from 3.5 to 2.8 and 10^{-4}.147/ The implicit cost per case of cancer averted was thus about $170 million. Nonetheless, most if not all these controls could satisfy the criteria for technology-based Committee bill standards.

A similar pattern emerges for the three benzene sources EPA declined to regulate. EPA figures show that requiring "available controls" for these sources would reduce estimated annual cancer incidences by 0.0055 (one every 182 years) for EB/S plants, and by 0.008-0.068 (one every 15 to 125 years) for benzene storage vessels.148/ For maleic anhydride, EPA's most recent analysis finds no benefit because of recent changes in emissions patterns;149/ based on earlier patterns that prevailed when EPA declined to regulate this source in 1984, controls would have averted an estimated 0.006-0.015 cancers per year (one every 67-167 years).150/ Applying 1983 EPA estimates of the costs of implementing "available controls" on these sources, the implied costs per case of cancer averted are $187-467 million for maleic anhydride (1984 emissions data), $176 million for EB/S, and $19-163 million for benzene storage vessels.151/

146/ Id. at 23537 cols. 2-3.

147/ Id. at 23537 col. 3.

148/ 51 Fed. Reg. at 34148 col. 1.

149/ Id.

150/ 49 Fed. Reg. 8386, 8389 cols. 2-3 (March 6, 1984).

151/ 1983 Benzene Fact Sheet at p. 15.

These implied cost-per-cancer-averted figures for the benzene controls rejected by EPA compare poorly to other Section 112 decisions and general cost-effectiveness criteria used today by federal regulators. Table #32 shows that imposing the rejected benzene controls would be very inefficient when measured against the previous decisions to regulate fugitive benzene and coke by-product recovery plant emissions.152/ They also are very expensive when compared against the yardstick of $3.5-10 million per incidence avoided, which EPA used to evaluate the benefits of reduced cancer risks in the recent refueling emissions proposal.153/ Nevertheless, most or all these controls would probably be mandated for the eight-year technology-based standards under the Committee bill.

Lastly, EPA's technology assessments indicate that few benzene sources would achieve MIRs of 10^{-6} using controls identified by EPA. For example, benzene controls rejected as unreasonably costly for fugitive emissions sources and coke by-product recovery plants would lower MIRs to 5.0×10^{-4} and 2.8×10^{-4}, respectively.154/ The "available controls" for the maleic anhydride, EB/S, and benzene storage source categories would leave MIRs ranging from 6×10^{-6} to 1.3×10^{-5}.155/ See Table #33.

152/ The apparent exception is refueling controls ($45 million per cancer averted), but this estimate takes only benzene emission reductions into account. See 52 Fed. Reg. at 31178 col. 1, 31181 col. 2. EPA relies on other benefits to justify the refueling proposal. Id. at 31177-81, 31183-84.

153/ Id. at 31184 col. 2.

154/ 49 Fed. Reg. at 23509 col. 3; 49 Fed. Reg. at 23537 cols. 2-3.

155/ 49 Fed. Reg. at 8389 col. 3 (1984 data for maleic anhydride); 50 Fed. Reg. 34148 col. 1).

Table #32: Costs and Effectiveness of Benzene Controls

COSTS AND EFFECTIVENESS OF BENZENE CONTROLS

SOURCE	ANNUAL INCIDENCE REDUCTION	ADDITIONAL ANNUAL COSTS (MILLIONS OF $$)	COST PER CANCER AVERTED (MILLIONS OF $$)
A. Required or Proposed Controls			
Fugitive Benzene	0.37	0.4	1.1
Coke By-Product	2.4	[savings] 1/	[savings] 1/
Refueling (Onboard)	4.0 2/	180	45 2/
B. Rejected Controls			
Additional Controls for Fugitive Benzene	0.01	3.3	330
Additional Controls for Coke By-Product	0.22	37.5	170
Available Controls for Maleic Anhydride 3/	0.006-0.015	2.8	187-467
Available Controls for EB/S	0.0055	0.97	176
Available Controls for Benzene Storage	0.008-0.068	1.3	19-163
C. Other Sources			
Stage I for Gasoline Marketing	0.07	91	1,300
TOTAL FOR REJECTED AND OTHER CONTROLS	0.32-0.39	137	351 - 428

1/ Value of recovered benzene exceeds control costs

2/ Does not include other (non-benzene) health benefits assumed by EPA

3/ Estimates based on 1984 emission data. See text

Table #33: Effectiveness of Benzene Controls in Reducing MIRs

EFFECTIVENESS OF IDENTIFIED BENZENE CONTROLS IN REDUCING MAXIMUM INDIVIDUAL RISKS

	SOURCE	RESIDUAL MIR	ANNUAL INCIDENCE REDUCTION	COST PER CANCER AVERTED (MILLIONS OF $$)
A.	Sources Other Than Gasoline Marketing			
	Additional Controls for Fugitive Benzene	5.0×10^{-4}	0.01	330
	Additional Controls for Coke By-Product	2.8×10^{-4}	0.22	170
	Available Controls for Maleic Anhydride 1/	$0.6\text{-}1.3 \times 10^{-5}$	0.006- 0.015	187-467
	Available Controls for EB/S	1.1×10^{-5}	0.0055	176
	Available Controls for Benzene Storage	3.4×10^{-5}	0.008- 0.068	19-163
B.	Gasoline Marketing Sources 2/			
	Refueling Controls	1.5×10^{-4}	4.0	45
	Refueling Controls Plus Stage I Controls	2.4×10^{-5}	4.07	67
	Refueling Plus Stage I Plus Benzene-in-Gasoline Controls	4.5×10^{-6} 3/	7.0 - 7.9	2,400 - 3,100

1/ Based on 1984 emissions.

2/ Estimates do not include non-benzene health benefits assumed by EPA; MIRs are the highest remaining for any gasoline marketing source, and in all cases bulk terminals (BTs) have the highest residual MIR

3/ Estimated assuming that benzene in gasoline reduction will reduce MIRs for BTs equipped with Stage I controls by the same percentage as for BTs without such controls

Meeting the Committee bill's 10^{-6} MIR criterion for health-based standards probably would not be technically possible in gasoline marketing operations, but any effort to reach that target unquestionably would be very expensive. Refueling controls (onboard) would lower "high" individual risks from self-serve exposures to below 10^{-7}, but would leave residential MIRs near service stations at 1.9×10^{-6}.156/ Adding Stage I controls would lower service station MIRs to 0.6×10^{-6}, but would leave MIRs of 2.4×10^{-5} near bulk terminals and 2.0×10^{-6} at bulk plants.157/ Reducing the benzene content of gasoline by 81 percent would reduce the bulk terminal MIR to about 5×10^{-6}, still not meeting the Committee bill test.158/ Presumably further benzene content reductions, if feasible, could attain the 10^{-6} criterion, but the costs would be enormous. Even the 81 percent reduction is estimated by EPA to cost from $18.6 to $21.7 billion per year.159/ That control, in combination with refueling and Stage I controls, involves a **total annual cost of $18.8 to 22 billion, and an implicit expenditure of $2.4 to $3.1 billion for each cancer averted.**

156/ Gas. Mktg. Anal. at p. 6-35.

157/ Id.

158/ Id.; see note 3 on Table 33.

159/ Gasoline Marketing Analysis at p. 7-42.

d. Coke oven emissions

EPA's recently-proposed standard for coke oven emissions160/ is based on an evaluation of "the three most stringent" options for reducing emissions. EPA's proposal would impose the second most stringent control strategy identified, which the Agency projects would reduce aggregate cancer risks from 6.9 to 4.0 cases per year, at an estimated annual cost of $19.3 million.161/ The implied expenditure per cancer averted is $6.7 million. The proposed standard would reduce the highest MIR from 3.4×10^{-2} to 1.6×10^{-2}.162/ EPA calls this option "the most stringent level. . .that all batteries could achieve over time short of partially or completely rebuilding."163/ According to EPA, the proposal would add one coke oven battery to the current list of fourteen unprofitable batteries.164/ Of primary interest for the purpose of this Report is the most stringent control option, which EPA rejected. EPA calls this a "LAER-based standard" which "incorporates controls as stringent as any applicable to new or existing coke ovens."165/ The Agency estimates that of 134 existing batteries, 14 already achieve

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160/ 52 Fed. Reg. 13586 (Apr. 23, 1987). The proposed standard would apply to emissions from wet-coal charged by-product coke oven batteries.

161/ 52 Fed. Reg. at 13593 col. 1.

162/ Id. The Coke Oven Preamble not only relies on the highest MIR, as has been the Agency's consistent post practice, but also provides estimates of the population exposed to lifetime risks above 1/100, 1/1,000, 1/10,000, 1/100,000, 1/one million, and 1/ten million. See 52 Fed. Reg. at 13594 (Table 1).

163/ Id. at 13593 col. 2.

164/ Id.

165/ Id. at 13593 col. 2., 13594 col. 3.

this level of control.166/ These findings suggest that this option is the one that would be required for the eight-year technology-based HAP standard under the Committee's bill.

According to EPA, complete or partial rebuilding, at nationwide capital costs ranging from $360 million to $5 billion, is the only path to compliance for the 120 batteries not currently achieving this level of control.167/ As a result of the "prohibitive" costs, EPA predicts "widespread closure of batteries and plants" under this option, accompanied by "severe economic and social dislocation, as well as increased reliance on imported coke."168/

Even the minority of existing facilities that could meet this control level could not survive long under the Committee bill if EPA's feasibility analysis is accurate. The Agency estimates that the risks remaining under this control option would be 0.9 cases of cancer per year and, most important, a MIR of 3×10^{-3}. This risk level is 3,000 times higher than the 10^{-6} level required for the "interim" health-based standard of the Committee bill, which must be achieved within eight years of promulgation. Unless much more effective controls are identified, **no existing (or, apparently, even new) coke oven batteries could meet the Committee bill's "interim" health-based standard.**

166/ Id. at 13593 col. 2.

167/ Id. at 13593 cols. 2-3, 13594 col. 3.

168/ Id. at 13593 col. 3, 1594 col. 3.

e. Vinyl chloride

By comparison to the other four HAPs reviewed above, the development of EPA's Section 112 standard for vinyl chloride in 1975-76,169/ and the recent reevaluation and reaffirmance of the standard in 1985,170/ provide little data for evaluating the impacts of Title V. Because risk assessment techniques were in their infancy in the mid-1970s, the Agency's original regulatory analysis of vinyl chloride emission did not produce the same kind of detailed annual incidence, MIR, and cost-effectiveness estimates that are available for the other HAPs. The more recent review was largely a qualitative look at the technological potential for further significant emissions reductions, and did not generate the kind of detailed risk assessment that normally accompanies formal regulatory proposals and final rules.

The EPA analysis of vinyl chloride nevertheless does provide a few helpful examples for the purposes of these views. **First**, EPA has found that the existing standard reduced risks to a low level, and does so quite cost-effectively as compared to the control that would be mandated under Title V. Specifically, EPA estimates that annual cancer incidence under the standard is 0.83 for all cancers.171/ This is a reduction from the pre-standard incidence of 16.5 cancers per year, for a reduction of 15.7 cases annually.172/

169/ *See* 40 Fed. Reg. 59532 (Dec. 24, 1975) (proposed standard); 41 Fed. Reg. 46560 (Oct. 21, 1976) (final standard).

170/ 50 Fed. Reg. 1182 (Jan. 9, 1985); EPA, *Vinyl Chloride: A Review of National Emission Standards* (EPA 450/3-82-003, Feb. 1982) ["VC Review"].

171/ 50 Fed. Reg. at 1182 col. 3.

172/ *Id*.

EPA also estimates that the annual cost of compliance with the standard is about $70 million,173/ representing an implied cost of $4.5 million per cancer averted.

Second, like other Section 112 standards, the vinyl chloride standard leaves a number of sources uncontrolled.174/ Because EPA incidence or MIR estimates for these sources are not readily available, it is unclear whether these sources (listed in Table #34) would be regulated under the Committee bill and, if so, whether the 10^{-6} test could be achieved.

173/ Id.

174/ EPA reaffirmed its decision not to control these sources in 1985 on the grounds that they already are "well-controlled" and that current emissions and risks are "small in comparison to sources covered by the VC standard." See 50 Fed. Reg. at 1186 cols. 1-2.

Table #34: Unregulated Sources of Airborne Vinyl Chloride

**UNREGULATED SOURCES
OF AIRBORNE VINYL CHLORIDE**

PVC Fabricators
(perhaps 8,000 facilities)

Miscellaneous Sources
(VC used as a chemical intermediate
or produced as a by-product)

Rail and Tank Cars and
Marine Unloading Facilities

Storage Facilities

Disposal (Landfill) Facilities

Source: EPA, Vinyl Chloride: A Review of National Emission Standards (EPA 450/3-82-002, Feb. 1982)

CHANGES IN EXISTING LAW

In compliance with section 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill as reported are shown as follows: Existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman:

THE CLEAN AIR ACT

TITLE I—AIR POLLUTION PREVENTION AND CONTROL

PART A—AIR QUALITY AND EMISSION LIMITATIONS

FINDINGS AND PURPOSES

* * * * * * *

RESEARCH, INVESTIGATION, TRAINING, AND OTHER ACTIVITIES

SEC. 103. (a) * * *

* * * * * * *

(g) The Administrator shall, not later than twelve months after the date of enactment of this subsection, transmit to the Committee on Environment and Public Works of the Senate and to the Committee on Energy and Commerce of the House of Representatives a report which shall:

(1) describe the current process and schedule for reviewing and establishing national primary and secondary ambient air quality standards;

(2) describe the measures taken to assure new scientific evidence is continuously incorporated in the review and revision of criteria documents and ambient air quality standards;

(3) describe the on-going or proposed research program for each air pollutant identifying open questions and corresponding studies which will assure that ambient air quality standards will be established and reviewed on a timely basis as provided in this Act;

(4) describe measures which are being implemented or which will be implemented to accelerate the standards review process; and

(5) set forth a proposed five-year budget and schedule for the activities conducted by the Agency pursuant to sections 108 and 109 of this Act.

The Administrator shall update the report required by this subsection annually.

* * * * * * *

GRANTS FOR SUPPORT OF AIR POLLUTION PLANNING AND CONTROL PROGRAMS

SEC. 105. (a)(1)(A) The Administrator may make grants to air pollution control agencies in an amount up to two-thirds of the cost of planning, developing, establishing, or improving, and up to one-half of the cost of maintaining, programs for the prevention and control of air pollution or implementation of national primary and secondary ambient air quality standards.

(B) Subject to subparagraph (C), the Administrator may make grants to air pollution control agencies within the meaning of paragraph (1), (2), or (4) of section 302(b) in an amount up to three-fourths of the cost of planning, developing, establishing, or improving, and up to three-fifths of the cost of maintaining, any program for the prevention and control of air pollution or implementation of national primary and secondary ambient air quality standards, in an area that includes two or more municipalities, whether in the same or different States.

(C) With respect to any air quality control region or portion thereof for which there is an applicable implementation plan under section 110, grants under subparagraph (B) may be made only to air pollution control agencies which have substantial responsibilities for carrying out such applicable implementation plan.

(D) The Administrator may make grants to air pollution control agencies in an amount up to two-thirds of the cost of planning, developing, establishing, or improving, and up to one-half the cost of maintaining, programs for the control of emissions of air pollutants pursuant to section 112(e) of this Act. There are authorized to be appropriated $35,000,000 in each of the fiscal years ending September 30, 1988, 1989, 1990, 1991, and 1992 to carry out the purposes of this subparagraph and section 112(e) of this Act.

* * * * * * *

INTERSTATE AIR QUALITY AGENCIES OR COMMISSIONS

SEC. 106. For the purpose of developing implementation plans for any interstate air quality control region designated pursuant to section 107 *or of implementing section 178,* the Administrator is authorized to pay, for two years, up to 100 per centum of the air quality planning program costs of *any commission established under section 178 or* any agency designated by the Governors of the affected States, which agency shall be capable of recommending to the Governors plans for implementation of national primary and secondary ambient air quality standards and shall include representation from the States and appropriate political subdivisions within the air quality control region. After the initial two-year period the Administrator is authorized to make grants to such agency *or such commission* in an amount up to three-fourths of the air quality planning program costs of such agency *or such commission.*

AIR QUALITY CONTROL REGIONS

SEC. 107(a) * * *

* * * * * * *

(d)(1) * * *

* * * * * * *

(5) A State may from time to time review, and as appropriate revise and resubmit, the list required under this subsection. The Administrator shall consider and promulgate such revised list in

accordance with this subsection. *Regardless of whether a State has made a submission under the first sentence of this paragraph, the Administrator may, from time to time, promulgate any appropriate revision to such list in accordance with this subsection.*

* * * * * * *

AIR QUALITY CRITERIA AND CONTROL TECHNIQUES

SEC. 108. (a)(1) * * *

* * * * * * *

(b)(1) [Simultaneously with the issuance of criteria under subsection (a), the] *The* Administrator shall, after consultation with appropriate advisory committees and Federal departments and agencies, issue to the States and appropriate air pollution control agencies information on air pollution control techniques, which information shall include data relating to the cost of installation and operation, energy requirements, emission reduction benefits, and environmental impact of the emission control technology. Such information shall include such data as are available on available technology and alternative methods of prevention and control air pollution. Such information shall also include data on alternative fuels, processes, and operating methods which will result in elimination or significant reduction of emissions.

* * * * * * *

(g) The Administrator shall, not less frequently than every five years, complete a thorough review, for each pollutant, of each of the criteria published pursuant to this section and shall make revisions in such criteria as may be appropriate in accordance with the provisions of this section. At intervals of twenty-four and forty-eight months after a revision, the Administrator shall publish addenda to such criteria reflecting the relevant air quality research which has become available since the most recent revision. The Administrator may review and revise criteria more frequently than required under this subsection.

(h) Not later than twenty-four months after the date of enactment of this subsection, the Clean Air Scientific Advisory Committee shall make a recommendation to the Administrator with respect to listing high-altitude concentrations of carbon monoxide pursuant to subsection (a)(1).

NATIONAL AMBIENT AIR QUALITY STANDARDS

SEC. 109. (a)(1) * * *
(A) * * *

* * * * * * *

(2) With respect to any air pollutant for which air quality criteria are *first* issued after the date of enactment of the Clean Air Amendments of 1970, the Administrator shall publish, [simultaneously with] *within six months of* the issuance of such criteria and information, proposed national primary and secondary ambient air quality standards for any such pollutant. [The procedure provided for in paragraph (1)(B) of this subsection shall apply to

the promulgation of such standards.**]** *The Administrator shall promulgate such standards within eighteen months of such proposal.*

* * * * * * *

[(c) The Administrator shall, not later than one year after the date of the enactment of the Clean Air Act Amendments of 1977, promulgate a national primary ambient air quality standard for NO_2 concentrations over a period of not more than 3 hours unless, based on the criteria issued under section 108(c), he finds that there is no significant evidence that such a standard for such a period is requisite to protect public health.

[(d)(1) Not later than December 31, 1980, and at five-year intervals thereafter, the Administrator shall complete a thorough review of the criteria published under section 108 and the national ambient air quality standards promulgated under this section and shall make such revisions in such criteria and standards and promulgate such new standards as may be appropriate in accordance with section 108 and subsection (b) of this section. The Administrator may review and revise criteria or promulgate new standards earlier or more frequently than required under this paragraph.**]**

(d)(1) Not later than six months after the revision of criteria for a pollutant required by section 108, but in no event later than five years after any previous revision of, or determination to retain, a standard for such pollutant, the Administrator shall, based on such criteria, propose either to retain or revise such standard, and within eighteen months of such proposal shall either publish a determination that the existing standard is in accordance with subsection (b) or promulgate a revised standard as may be appropriate in accordance with subsection (b). The Administrator may promulgate revised standards earlier or more frequently than required under this paragraph.

* * * * * * *

(e) The Administrator shall, not later than twelve months after the date of enactment of this subsection, promulgate a national primary ambient air quality standard for sulfur dioxide concentrations over a period of not more than one hour which is consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such a standard is not requisite to protect public health allowing an adequate margin of safety.

(f) The Administrator shall, not later than thirty-six months after the date of enactment of this subsection, promulgate a national primary ambient air quality standard for ozone concentrations reflecting daily ozone exposure events averaged over a period not less than six hours or more than twelve hours in length and which is consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such standard is not requisite to protect public health allowing an adequate margin of safety.

(g) The Administrator shall, not later than forty-eight months after the date of enactment of this subsection, promulgate a national primary ambient air quality standard for nitrogen dioxide concentrations for short-term exposure which is consistent with subsection (b), unless, based on criteria issued under section 108, the Ad-

ministrator finds that such standard is not requisite to protect public health allowing an adequate margin of safety.

(h) The Administrator shall, not later than sixty months after the date of enactment of this subsection, promulgate a national primary ambient air quality standard for acid aerosols that is consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such standard is not requisite to protect public health allowing an adequate margin of safety.

(i) The Administrator shall, not later than twenty-four months after the date of enactment of this subsection, promulgate a national secondary ambient air quality standard for fine particles with an aerodynamic diameter smaller than or equal to 2.5 micrometers that is consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such standard is not requisite to protect visibility.

(j) The Administrator shall, not later than thirty-six months after the date of enactment of this subsection, promulgate a national secondary ambient air quality standard or standards for ozone concentrations consistent with subsection (b), unless, based on criteria issued under section 108, the Administrator finds that such standard (or standards) is not requisite to protect soils, waters, crops, forests, vegetation, materials, visibility or other elements of public welfare.

IMPLEMENTATION PLANS

SEC. 110. (a)(1) * * *
(2) * * *
(A) * * *

* * * * * * *

(E) it contains adequate provisions (i) prohibiting any stationary source *or sources* within the State from emitting any air pollutant in amounts which will (I) **[**prevent**]** *interfere with* attainment or maintenance by any other State of any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility, *or (III) contribute to atmospheric loading of pollutants or their transformation products which may reasonably be anticipated to cause or contribute to an adverse effect on public health or welfare or the environment in any other State or foreign country,* and (ii) insuring compliance with the requirements of section 126, relating to interstate pollution abatement;

* * * * * * *

[(I) it provides that after June 30, 1979, no major stationary source shall be constructed or modified in any nonattainment area (as defined in section 171(2)) to which such plan applies, if the emissions from such facility will cause or contribute to concentrations of any pollutant for which a national ambient air quality standard is exceeded in such area, unless, as of the time of application for a permit for such construction or modification, such plan meets the requirements of part D (relating to nonattainment areas);**]**

(I) it provides that in any nonattainment area to which such plan should apply, no major stationary source shall be constructed or modified if the emissions from such source will cause or contribute to concentrations of any air pollutant for which a national ambient air quality standard is exceeded in such area, if—

(i) the date for attainment of the primary national ambient air quality standard established under section 172(a)(3), section 172(d)(2), or section 172(e)(1)(B) is past and such area remains nonattainment (unless otherwise provided under section 172(e)(1)(C));

(ii) the State has not submitted a plan that meets the requirements of section 172(b)(11)(B), section 172(d), section 173, and if applicable, section 172(e);

(iii) in the case of a newly promulgated or revised primary national ambient air quality standard or a notice of plan inadequacy under subparagraph (H), the State has not submitted a plan that meets the requirements of this section and, to the extent applicable, part D; or

(iv) the State or a local government with responsibility to implement a portion of the plan is not implementing each requirement of a plan adopted or promulgated in accordance with section 172 and each requirement promulgated under section 130;

* * * * * * *

(c)(1) The Administrator shall, after consideration of any State hearing record, promptly prepare and publish proposed regulations setting forth an implementation plan, or portion thereof, for a State if—

(A) the State fails to submit an implementation plan which meets the requirements of this section,

(B) the plan, or any portion thereof, submitted for such State is determined by the Administrator not to be in accordance with the requirements of this section, or

(C) the State fails, within 60 days after notification by the Administrator or such longer period as he may prescribe, to revise an implementation plan as required pursuant to a provision of its plan referred to in subsection (a)(2)(H).

If such State held no public hearing associated with respect to such plan (or revision thereof), the Administration shall provide opportunity for such hearing within such State on any proposed regulation. The Administrator shall, **[**within six months**]** *as expeditiously as practicable* after the date required for submission of such plan (revision thereof), promulgate any such regulations unless, prior to such promulgation, such State has adopted and submitted a plan (or revision) which the Administrator determines to be in accordance with the requirements of this section. Notwithstanding the preceding sentence, any portion of a plan relating to any measure described in the first sentence of section 121 (relating to consultation) or the consultation process required under such section 121 shall not be required to be promulgated before the date eight months after such date required for submission.

* * * * * * *

(k) For the purposes of this Act, any State or air pollution control agency is authorized, in the adoption, implementation or enforcement of any provision of a State implementation plan, to control the emissions from any vessel while in any port within the jurisdiction of such State or air pollution control agency or on tidal waters within the boundaries of the State.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

SEC. 112. (a) * * *

(1) * * *

* * * * * * *

(3) The terms [“stationary source,”] “modification,” “owner or operator” and “existing source” shall have the same meaning as such terms have under section 111(a).

(4) The term “major source” means any stationary source (including all emission points and units of such source located within a contiguous area and under common control) of air pollutants that emits, or has the potential to emit, five tons per year or more of any air pollutant or twenty-five tons per year or more of any combination of air pollutants which have been listed pursuant to subsection (b)(2). The Administrator may establish a lesser quantity for a major source than that specified in the previous sentence, on the basis of the potency of the air pollutant or other relevant factors.

(5) The term “area source” means any stationary or mobile source of air pollutants that is not a major source and that emits, or has the potential to emit, any air pollutant or pollutants which have been listed pursuant to subsection (b)(2).

(6) The term “stationary source” means any facility or installation or unit of such facility or installation which emits or may emit any air pollutant.

(b)(1) The Administrator shall promulgate emission standards in accordance with this subsection for every category or subcategory of major sources of air pollutants listed pursuant to paragraph (2).

(2)(A) The provisions of this subsection shall apply to each of the air pollutants on the list of the air pollutants contained in part A of Committee Print 100–55 published by the Committee on Environment and Public Works of the United States Senate and entitled “Air Pollutants Subject to Section 112(b) of the Clean Air Act.”

(B) The Administrator shall, from time to time, but not less often than every three years, review and revise that list established by subparagraph (A). Any person may petition the Administrator to modify such list by adding or removing a substance. Within one hundred and eighty days after receipt of such petition the Administrator shall either grant such petition or publish a written explanation of why the petition should not be granted. The Administrator may not deny a petition on the basis of inadequate resources or time for review.

(C)(i) The Administrator shall add such substance to the list upon a showing by the petitioner that the substance is an air pollutant that is known to cause or may reasonably be anticipated to cause adverse effects on human health or the environment, or that the substance is an air pollutant that qualifies for addition under subsection (d)(2) of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986.

(ii) The Administrator shall remove such substance from the list upon a showing by the petitioner that there is complete, valid, and adequate data on the health and environmental effects of such substance and that emissions or ambient concentrations of the substance will not cause any adverse effects on the health of persons or the environment, or that the substance qualifies for deletion under subsection (d)(3) of such section 313.

(iii) No substance, practice, process, or activity regulated under part B of this Act shall be subject to regulation under this subsection solely due to its adverse effects on the environment.

(D) The Administrator shall publish (and from time to time revise) a list of categories of all major sources which emit air pollutants listed pursuant to this subsection. The categories and subcategories of major sources designated pursuant to this subparagraph shall, to the extent practicable, be consistent with the source categories established pursuant to section 111 (with respect to new source performance standards) and part C (with respect to prevention of significant deterioration) of this Act. In addition to such other categories and subcategories as the Administrator may designate, the Administrator shall include in such list treatment, storage and disposal facilities for hazardous and solid waste and publicly owned wastewater treatment works.

(E) The Administrator shall establish test measures and other analytic procedures for monitoring and measuring emissions and ambient concentrations of air pollutants subject to this subsection.

(3) An emission standard promulgated under this subsection shall require the maximum degree of reduction in emissions of each air pollutant subject to this subsection (including a prohibition of such emissions, if achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any nonair quality health and environmental impacts and energy requirements, determines is achievable for sources in the category or subcategory to which such emission standard applies, through application of measures, processes, methods, systems or techniques including, but not limited to, measures which—

> *(A) reduce the volume of such pollutants through process changes, substitution of materials or other modifications,*
>
> *(B) enclose systems or processes to eliminate emissions, or*
>
> *(C) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point.*

The degree of reduction in emissions that is achievable for sources in a category or subcategory shall reflect the most stringent emission level that is achieved in practice by a source in the same category or subcategory, as determined by the Administrator. In no event shall an emission standard promulgated under this subsection result in emissions of any pollutants that will exceed the emissions of such pollutant allowed by any applicable standard established pursuant *to section 111 or an emission limitation for any facility in such category or subcategory of sources established in accordance with section 171 (3) or (6), as appropriate.*

(4)(A) As part of the regulations for a category or subcategory of major sources promulgated under this subsection, the Administrator shall promulgate such leak prevention, detection and correction requirements as appropriate, which may include monitoring, recordkeeping, reporting, vapor recovery, secondary containment, and other design, equipment, work practice and operational requirements, which shall be applicable to devices and systems (including pumps, compressors, valves, flanges, connectors, containers, and vessels) from which there may be emissions of any pollutant subject to this subsection. Such requirements shall be adequate to assure the protection of human health and the environment.

(B) Such regulations may require the owner or operator of a major source to carry out an annual audit and safety inspection of such source. The purpose of such audit and investigation shall be to locate and correct all leaks and other preventable routine or episodic releases of any air pollutant subject to this subsection. The results of such inspection and the results of any other safety inspection, survey or audit carried out with respect to the source shall be available to the Administrator, to the State in which the source is located, and to the public consistent with the provisions of sections 322, 323, and 324 of the Emergency Planning and Community Right-to-Know Act of 1986.

(5) Notwithstanding the requirements of this subsection or subsection (d), no existing source that has installed reasonably available control technology, best available control technology (as defined in section 169(3)), or technology required to meet a lowest achievable emission rate shall be required to comply with the emission standard applicable to such major source under this subsection until the date five years after the date on which such technology has been installed, as determined by the Administrator.

(6)(A) Not later than twelve months after the date of enactment of this subsection, the Administrator shall list under paragraph (2)(D) the categories and subcategories of major sources which emit air pollutants subject to regulation under this subsection. The Administrator shall promulgate regulations establishing emission standards for such sources as expeditiously as practicable, assuring that—

(i) emission standards for major sources of acrylonitrile, butadiene, cadmium, carbon tetrachloride, chloroform, chromium, ethylene dichloride, ethylene oxide, methylene chloride, perchloroethylene, and trichloroethylene are promulgated not later than eighteen months after the date of enactment of this subsection;

(ii) emission standards for 25 per centum of such categories or subcategories shall be promulgated not later than three years after the date of enactment of this subsection;

(iii) emission standards for an additional 25 per centum of such categories or subcategories shall be promulgated not later than five years after the date of enactment of this subsection; and

(iv) emission standards for all categories and subcategories shall be effective not later than ten years after the date of enactment of this subsection.

(B) In determining priorities for promulgating standards for categories and subcategories of major sources for the purpose of subparagraph (A), the Administrator shall consider—

(i) the quantity of air pollutants subject to this subsection that each such category or subcategory will emit, including any information available under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986;

(ii) the known or anticipated adverse effects of such pollutants emitted on human health and the environment, including any information available under section 104(i)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980; and

(iii) exposure to and the location of sources of such pollutants and the consequent urgency of a national standard.

(C) The Administrator shall review, and revise as necessary, emission standards promulgated under this section no less often than every five years.

(7)(A) Not later than twelve months after the date of enactment of this subsection, the Administrator shall publish (and from time to time revise) a list of categories of area sources of the air pollutants subject to this subsection. At the time any category of area sources is listed, the Administrator shall also publish a detailed estimate of the total quantity of such air pollutants emitted by such category of area sources in calendar year 1988 and shall incorporate such estimate into a national inventory of aggregate emissions from area sources. The categories of area sources listed shall include, but not be limited to, degreasing and solvent cleaning operations; dry cleaners; pesticide applications; wood combustors; other small combustion units; gasoline marketing; mobile sources; and materials transportation.

(B) It shall be the objective of this paragraph to reduce the national inventory of emissions from area sources by an amount not less than 25 per centum of the 1988 inventory not later than four years after the date of enactment of this subsection. It shall be a further objective of this paragraph to reduce the national inventory of emissions from area sources by an amount not less than 10 per centum of the 1988 inventory during each of three two-year periods following the initial reduction, for a total reduction of 55 per centum of the national inventory of emissions emitted from area sources not later than ten years after the date of enactment of this subsection.

(C) To achieve the objectives established by subparagraph (B), the Administrator may use the authorities of this Act, and any other Act administered by the Environmental Protection Agency.

(D) The Administrator shall report to the Congress, not later than five years after the date of enactment of this subsection and in a subsequent report not later than ten years after such date of enactment, on actions taken to implement the objectives of subparagraph (B) and progress in meeting such objectives.

[(b)**]** **[**(*c*)(1)(A) The Administrator shall, within 90 days after the date of enactment of the Clean Air Amendments of 1970, publish (and shall from time to time thereafter revise) a list which includes each hazardous air pollutant for which he intends to establish an emission standard under this section.

[(B) Within 180 days after the inclusion of any air pollutant in such list, the Administrator shall publish proposed regulations establishing emission standards for such pollutant together with a notice of a public hearing within thirty days. Not later than 180 days after such publication, the Administrator shall prescribe an emission standard for such pollutant, unless he finds, on the basis of information presented at such hearings, that such pollutant clearly is not a hazardous air pollutant. The Administrator shall establish any such standard at the level which in his judgment provides an ample margin of safety to protect the public health from such hazardous air pollutant.

[(C) Any emission standard established pursuant to this section shall become effective upon promulgation.

[(2) The Administrator shall, from time to time, issue information on pollution control techniques for air pollutants subject to the provisions of this section.]

(c)(1)(A) The Administrator shall, within ninety days after the date of enactment of the Clean Air Amendments of 1970, publish (and from time to time thereafter revise) a list which (i) includes each hazardous air pollutant and each air pollutant identified under subparagraph (B), for which the Administrator shall establish an emission standard under this subsection, and (ii) identifies the categories of sources which emit each such pollutant. This list shall include, but not be limited to, arsenic, asbestos, benzene, beryllium, coke oven emissions, mercury, radionuclides, and vinyl chloride. In the case of any substance listed under the preceding sentence for which no emissions standard had been promulgated as of the date of enactment of the Clean Air Standards Attainment Act of 1987, the Administrator is authorized to establish emissions standards under subsection (b) in lieu of this subsection unless the Administrator elects to add such substance to the list under this subsection in accordance with subparagraph (B) of this paragraph. Emission standards for any such substance shall be promulgated not later than eighteen months after such date of enactment. The Administrator is authorized to establish emission standards under subsection (b) in lieu of this subsection for emissions of any substance listed under this paragraph from a boiler.

(B) The Administrator shall add any air pollutant to the list established by this paragraph (whether or not the Administrator has information with respect to such air pollutant sufficient to establish a specific standard) whenever, in the judgment of the Administrator, available evidence indicates that, even after compliance with regulation of the sources of such air pollutant under this Act, including an emission standard in accordance with subsection (b), it may reasonably be anticipated that the air pollutant will cause or contribute to—

(i) an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness (including, but not limited to, substances which are carcinogenic, mutagenic, teratogenic, neurotoxic, which cause reproductive dysfunction, or

which are acutely or chronically toxic, whether individually or by reason of cumulative or synergistic effects), or

(ii) significant adverse effects on the environment, wildlife, aquatic life or other natural resources, whether through ambient concentrations, bioaccumulation, deposition, or otherwise.

(C) Not later than twelve months after the enactment of this subparagraph, and after notice and opportunity for public comment, the Administrator shall establish by rule criteria for listing air pollutants under this paragraph. Such criteria shall include consideration of the health and environmental effects of such pollutants, including the likelihood of acute or chronic adverse health effects for the potentially most exposed persons.

(D)(i) The Administrator shall assess the health and environmental effects of various air pollutants or classes of air pollutants to determine whether or not such pollutants meet the criteria for listing established by subparagraph (C). The Administrator shall conduct assessments for air pollutants or classes of pollutants and shall, to the extent practicable, complete each assessment within a two-year period. Each year the Administrator shall publish and take comment on the list of pollutants which are candidates for assessment in the following year.

(ii) The National Toxicology Program, through its Director, shall make recommendations to the Administrator as may be appropriate with respect to air pollutants which should be subject to assessment pursuant to this subparagraph.

(iii) The Administrator shall submit preliminary results from each assessment to the Science Advisory Board for review and comment before publishing the assessment in final form. The Board shall respond, as it deems appropriate, but in no event shall the Board's review delay the completion of any assessment under this subparagraph.

(iv) At the conclusion of the two-year period the Administrator shall publish a determination that—

(I) the air pollutant shall be added to the list under this paragraph,

(II) the air pollutant will not be added to the list under this paragraph, or

(III) there is not sufficient information to determine whether the air pollutant should be added to such list.

Such determination shall be made after opportunity for comment from interested parties. Such determination shall be published together with a statement of the basis for such determination and an identification of the information available to the Administrator at the time of the determination. A determination pursuant to subclause (II) is a final Agency action.

(E) If, with respect to any pollutant or class of pollutants, the Administrator determines that there is not sufficient information pursuant to subparagraph (D)(iv)(III), the Administrator shall establish a research program to collect the necessary information and a date (no later than five years after the date of the initial determination) on which a further determination will be made. The Administrator is authorized to permit persons who own or operate facilities which emit the pollutant or other persons to provide for technically adequate and timely research. If, within ninety days of the determina-

tion that further research is necessary, no person has, in the judgment of the Administrator, undertaken (or committed to undertake) the described research program or provided the results of such research, the Administrator shall initiate or assure the initiation of the research program and thereafter conduct and complete the testing or other research for such pollutant. In any case in which the Administrator initiates or conducts research, the United States may seek reimbursement from the owners or operators of facilities which emit the pollutant to recover all costs incurred in preparing and conducting such research and such persons shall be liable for such costs. If there is more than one such owner or operator the Administrator may allocate the costs of the research program among those persons who are owners or operators of facilities emitting the pollutant according to the volumes of such emissions or according to such other factors as the Administrator determines will provide for an equitable allocation of the costs.

(F) Any person may petition the Administrator to list an air pollutant under subparagraph (B). Within one hundred and eighty days after the receipt of such petition the Administrator shall either grant such petition or publish a written explanation of why the petition should not be granted. If the Administrator grants the petition, the air pollutant may be added to the list established by this paragraph or may be included on the list of substances under subparagraph (D)(i) for which an assessment will commence in the following year, except that the Administrator shall not be required to commence more than seven such assessments in any year as a result of granting such petitions.

(2)(A) Not later than thirty-six months after the inclusion of any air pollutant on the list established by paragraph (1), the Administrator shall promulgate an emission standard or standards for all categories of sources of such pollutant. The Administrator shall establish any such emission standard or standards at the level which, in the judgment of the Administrator, provides an ample margin of safety to protect the public health, unless a more stringent standard is required to protect the environment.

(B) No consideration of costs, economic, energy or other factors or technological feasibility shall be included in the determination of the appropriate level of any emission standard to protect the public health under this subsection.

(C) Notwithstanding the requirements of subparagraph (A), the Administrator may establish an interim emission standard for an air pollutant classified as a probable or possible human carcinogen which includes other than an ample margin of safety for the carcinogenic effects of such air pollutant: Provided, That such standard reduces the risk of carcinogenic effects to which the most exposed individual in the ambient environment is exposed to no more than one in one million, as determined in accordance with the Guidelines for Carcinogenic Risk Assessment published by the Administrator in August 1986. If the Administrator establishes an emission standard under authority of this subparagraph, the Administrator shall review and revise as necessary such standard no less often than each five years. The Administrator shall publish a list of all major sources emitting any air pollutant for which a standard is established under authority of this subparagraph and each State in

which a source on the list is located shall provide an opportunity for public hearing on the health impacts of such source pursuant to guidance of the Administrator established under subsection (e)(2).

(3) Any emission standard established pursuant to this subsection shall become effective upon promulgation and, with respect to new sources, shall apply to such sources the construction or modification of which was commenced after the date on which such standard was proposed.

(4) The Administrator shall, from time to time, issue information on pollution control techniques for air pollutants subject to the provisions of this subsection.

[(c)] [(*d*)(1) After the effective date of any emission standard under this section—

[(A) no person may construct any new source or modify any existing source which in the Administrator's judgment, will emit an air pollutant to which such standard applies unless the Administrator finds that such source if properly operated will not cause emissions in violation of such standard, and

[(B) no air pollutant to which such standard applies may be emitted from any stationary source in violation of such standard, except that in the case of an existing source—

[(i) such standard shall not apply until 90 days after its effective date, and

[(ii) the Administrator may grant a waiver permitting such source a period of up to two years after the effective date of a standard to comply with the standard, if he finds that such period is necessary for the installation of controls and that steps will be taken to assure that the health of persons will be protected from imminent endangerment.]

(d)(1) After the effective date of any emission standard under this section—

(A) No person may construct any new source or modify any existing source which, in the judgment of the Administrator (or the judgment of a State acting pursuant to a program approved under subsection (e)), will emit an air pollutant to which such standard applies, unless the Administrator (or the State) finds that such source, if properly operated, will not cause emissions in violation of such standard and establishes such requirements as are necessary to assure proper operation of such source.

(B) No air pollutant may be emitted from any major source in violation of an emission standard under subsection (b), except that in the case of an existing source the Administrator shall establish a compliance date or dates for each category of existing sources, which shall provide for compliance as expeditiously as practicable, but in no event later than three years after the effective date of such standard. The Administrator may grant a waiver permitting an existing source a period of up to two additional years after the compliance date established under this clause to comply with the standard, if the Administrator finds that such a period is necessary for the installation of controls and that steps will be taken during the period of the waiver to assure that the health of persons will be protected from imminent endangerment.

(C) No air pollutant to which an emission standard under subsection (c) applies may be emitted from any stationary source in violation of such standard, except that in the case of an existing source—

(i) the Administrator shall, after notice and opportunity for public comment, establish a compliance date or dates for each category of existing sources, which shall provide for compliance as expeditiously as practicable, but in no event later than two years after the effective date of such standard; and

(ii) in the case of a pollutant for which there is no health effects threshold, the Administrator may delay for a particular existing source or category of existing sources compliance with the standard for not to exceed eight years if the Administrator determines, based on specific information submitted by the owner or operator of such source or sources and other information available to the Administrator, that owners or operators of such source or sources would experience extraordinary economic hardship in compliance with such standard and requires that such source or category of sources comply with an alternative emission limitation in accordance with subsection (b)(3) and make reasonable further progress toward compliance with the emission standard under subsection (c).

(2) The President may exempt any stationary source from compliance with paragraph (1) for a period of not more than two years if he finds that the technology to implement such standards is not available and the operation of such source is required for reasons of national security. An exemption under this paragraph may be extended for one or more additional periods, each period not to exceed two years. The President shall make a report to Congress with respect to each exemption (or extension thereof) made under this paragraph.

(3) Emission standards and other requirements under this section for stationary sources shall be imposed through permits. A single permit may be issued for a facility with multiple sources, including a permit that allows the operation of new or modified sources within such facility without further separate application procedures, if such permit assures compliance with paragraph (1).

[(d)**]** **[**(*e*)(1) Each State may develop and submit to the Administrator a procedure for implementing and enforcing emission standards for hazardous air pollutants for stationary sources located in such State. If the Administrator finds the State procedure is adequate, he shall delegate to such State any authority he has under this Act to implement and enforce such standards.

[(2) Nothing in this subsection shall prohibit the Administrator from enforcing any applicable emission standard under this section.**]**

(e)(1) Each State may develop and submit to the Administrator for approval pursuant to this subsection a program for the implementation and enforcement of emission standards for air pollutants subject to this section from stationary sources or for the prevention and mitigation of sudden, catastrophic releases to the air of substances that may cause acute adverse health effects from facilities in such

State. A program submitted by a State under this subsection may provide for partial or complete delegation of the Administrator's authorities and responsibilities to implement and enforce such emission standards and prevent the release of such substances under subsections (b), (c), and (g) of this section.

(2) Not later than twelve months after the date of enactment of this paragraph, the Administrator shall publish guidance which would be useful to the States in developing programs for submittal under this subsection. Such guidance shall, at a minimum, include permitting requirements for new and existing major sources of air pollutants subject to subsections (b) and (c). The guidance shall also provide for the registration of all facilities producing, processing, handling or storing any substance listed pursuant to subsection (g) in amounts greater than the threshold quantity.

(3) The Administrator shall establish and maintain an air toxics clearinghouse to provide technical assistance and information to the States on measures, methods, practices and techniques effective in reducing the emission of air pollutants subject to this section.

(4) Each State which submits a program under this section shall include as an element in such program provisions for the review of high-risk point sources of toxic air pollutants. At a minimum such provisions shall provide for the notification by general circulation newspaper and other means of persons who may be affected by emissions from each high-risk point source and the opportunity for public hearing near the location of such sources on the potential health and environmental consequences of the air emissions from the source and the measures available to reduce emissions or exposure. The Administrator shall publish in the Federal Register, not later than twelve months after the date of enactment of this subsection, a list of the high-risk point sources of toxic air pollutants known to the Agency. The Administrator shall from time to time, but not less often than every three years, review and revise the list of point sources required by this paragraph. The Administrator may establish such other regulations and guidelines as appropriate to carry out the requirements of this paragraph.

(5) Upon application of a State, the Administrator may make grants, subject to such terms and conditions as the Administrator deems appropriate, to such State for the purpose of assisting the State in developing and implementing a program or partial program for submittal and approval under this subsection. Programs assisted under this paragraph may include program elements addressing air pollutants other than those specifically subject to this section.

(6) Not later than one hundred and eighty days after receiving a program or partial program submitted by a State pursuant to the provision of paragraph (1), and after notice and opportunity for public comment, the Administrator shall either approve or disapprove such program. The Administrator shall disapprove any program submitted by a State, if the Administrator determines that—

(A) the authorities contained in such program or partial program are not adequate to assure compliance by all sources within the State with each applicable standard, regulation or requirement established by the Administrator under subsection (b), (c) or (g);

(B) adequate authority does not exist, or adequate resources are not available, to implement such program or partial program;

(C) the schedule for implementing such program or partial program and assuring compliance by affected sources is not sufficiently expeditious; or

(D) the program or partial program is otherwise not in compliance with the guidance issued by the Administrator under paragraph (2) or is not likely to satisfy, in whole or in part, the objectives of this section.

If the Administrator disapproves a State program or partial program, the Administrator shall notify the State of any revisions or modifications necessary to obtain approval. The State may revise and resubmit the proposed program for review and approval pursuant to the provisions of this subsection.

(7) Whenever the Administrator determines, after public hearing, that a State is not administering and enforcing a program or partial program approved pursuant to this subsection in accordance with the guidance published pursuant to paragraph (2) or the requirements of paragraph (5), the Administrator shall so notify the State and, if appropriate action is not taken within ninety days, the Administrator shall withdraw approval of such program or partial program. The Administrator shall not withdraw approval of any program or partial program unless the State shall have been notified and the reasons for withdrawal shall have been stated in writing and made public.

(8) Nothing in this subsection shall prohibit the Administrator from enforcing any applicable emission standard under this section.

[(e)**]**(*f*)(1) For purposes of this section, if in the judgment of the Administrator, it is not feasible to prescribe or enforce an emission standard for control of a **[**hazardous air pollutant or pollutants,**]** *air pollutant or pollutants subject to subsection (b) or (c)* he may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof, which in his judgment is adequate to protect the public health from such **[**pollutant or pollutants**]** *air pollutant or pollutants subject to subsection (b) or (c)* with an ample margin of safety *or complies with subsection (b)(3), as appropriate.* In the event the Administrator promulgates a design or equipment standard under this subsection, he shall include as part of such standard such requirements as will assure the proper operation and maintenance of any such element of design or equipment.

(2) For the purpose of this subsection, the phrase not feasible to prescribe or enforce an emission standard" means any situation in which the Administrator determines that (A) a hazardous **[**pollutant or pollutants**]** *air pollutant or pollutants subject to subsection (b) or (c)* cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State, or local law, or (B) the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations.

(3) If after notice and opportunity for public hearing, any person establishes to the satisfaction of the Administrator that an alterna-

tive means of emission limitation will achieve a reduction in emissions of any air pollutant at least equivalent to the reduction in emissions of such air pollutant achieved under the requirements of paragraph (1), the Administrator shall permit the use of such alternative by the source for purposes of compliance with this section with respect to such pollutant.

(4) Any standard promulgated under paragraph (1) shall be promulgated in terms of an emission standard whenever it becomes feasible to promulgate and enforce such standard in such terms.

(5) The authority of this subsection shall be available for the regulation of area sources under subsection (b)(7).

(g)(1) It shall be the objective of the regulations and programs authorized under this subsection to prevent the release to the air and to minimize the consequences of any accidental release of any substance listed pursuant to paragraph (2). The owners and operators of facilities producing, processing, handling or storing such substances have a general duty to design and maintain a safe facility taking such steps as are necessary to prevent releases and to minimize the consequence of accidental releases which do occur.

(2) Within one hundred and eighty days after the enactment of this subsection, the Administrator shall publish a list of substances which may, as the result of sudden events, be released as air pollutants in concentrations that may reasonably be anticipated to cause acute adverse health effects in humans. The list shall be drawn from, but not be limited to, those substances on the list established by section 302 of the Emergency Planning and Community Right-to-Know Act of 1986. The initial list of such substances shall include each of those chemicals on the list in part B of the Committee Print 100–55 of the Senate Committee on Environment and Public Works, entitled "Substances Subject to Section 112(g) of the Clean Air Act." The Administrator shall from time to time (but not less often than every five years) review and revise the list established by this paragraph adding substances which, as a result of sudden events, may be released as air pollutants in concentrations that may reasonably be anticipated to cause acute adverse health effects in humans. At the time any substance is placed on such list, the Administrator shall establish a threshold quantity for such substance, taking into account the toxicity (including short- and long-term health effects), reactivity, volatility, dispersability, combustability or flammability of the substance. The threshold quantity for each substance appearing in the Committee Print 100–55 shall be the same as the threshold planning quantity for such substance under section 302 of the Emergency Planning and Community Right-to-Know Act of 1986, except that the threshold quantity for trifluorochloroethylene shall be 7,300 pounds. The Administrator is authorized to establish a greater threshold quantity for, or to exempt entirely, any substance that is a nutrient used in agriculture when held by a farmer.

(3)(A) Not later than eighteen months after the date of enactment of this subsection (or twelve months after a substance is listed under paragraph (2), whichever is later), the owner or operator of each facility at which a substance listed pursuant to paragraph (2) is present in amounts greater than the threshold quantity shall conduct and complete a hazard assessment for each such substance present at the facility. The purpose of such assessments shall be to

anticipate the consequences of a range (including worst case events) of accidental releases of such substances to the air from the facility and to provide information that may aid in the prevention or mitigation of or response to such accidental releases.

(B) The hazard assessments required by this paragraph shall include, but not be limited to, the following elements—

(i) basic data on the facility, units at the facility which contain or process substances listed under paragraph (2) (including the longitude and latitude of such units), facility operating procedures, population of the nearby communities, and the meteorology of the area where the facility is located;

(ii) an identification of the potential sources of release to the air of substances listed under paragraph (2);

(iii) an identification of any previous releases including the amounts released, frequencies and durations;

(iv) an identification of a range (including worst case events) of potential releases including an estimate of the size, concentration, and duration of such potential releases and a correlation of such factors with the distance from the source of release;

(v) a determination of potential exposure (including the concentration and duration of exposure) for all persons who may be put at risk as the result of a release;

(vi) a determination of the probability of exposure as the result of various release scenarios including consideration of meteorological factors;

(vii) information on the toxicity of the substances listed under paragraph (2) present at the facility;

(viii) a review of the efficacy of various release prevention and control measures; and

(ix) a sensitivity analysis with respect to the uncertainties and assumptions incorporated in the hazard assessment.

(C) The Administrator is authorized to accept hazard assessments that contain the substantial equivalent of, though are not identical to, the elements described in subparagraph (B). Each hazard assessment prepared pursuant to this paragraph shall be updated biennially.

(D) Hazard assessments prepared pursuant to the requirements of this paragraph shall be available to the Administrator, to the Chemical Safety and Hazards Investigations Board, to the State in which the facility is located, to any local emergency planning entity or public safety agency having responsibility for planning or response with respect to releases which may occur from such facility, and to the public subject to the conditions of sections 322, 323, and 324 of the Emergency Planning and Community Right-to-Know Act of 1986.

(E) Not later than twelve months after the date of enactment of this paragraph, the Administrator shall publish guidance with respect to the preparation of hazard assessments as required by this subsection. As a part of such guidance, the Administrator may collect and publish information on accident scenarios and consequences covering a range of possible events for various substances listed under paragraph (2). The Administrator shall establish a program of long-term research to develop and disseminate information on methods and techniques of hazard assessment which may be

useful in improving and validating the procedures employed in the preparation of hazard assessments under this paragraph.

(4)(A) There is hereby established within the Environmental Protection Agency an independent safety board to be known as the Chemical Safety and Hazards Investigations Board.

(B) The board shall consist of five members including a chairperson who shall be appointed by the President, by and with the advice and consent of the Senate. The other four members of the Board shall be appointed by the Administrator of the Environmental Protection Agency and may be selected from individuals in private life, or designated from the staff of the Agency or other agencies of the United States. At any given time, no less than three members of the Board shall be individuals who have been appointed on the basis of technical qualification, professional standing, and demonstrated knowledge in the fields of accident reconstruction, safety engineering, human factors, chemical safety, toxicology or chemical regulation.

(C) The terms of office of members of the Board shall be five years, except as otherwise provided in this subparagraph. Any individual appointed to fill a vacancy occurring on the Board prior to the expiration of the term of office for which his or her predecessor was appointed shall be appointed for the remainder of the term. Upon the expiration of his or her term of office, a member shall continue to serve until his or her successor is appointed and shall have qualified. Any member of the Board may be removed by the President for inefficiency, neglect of duty, or malfeasance in office.

(D) The chairperson shall be the chief executive officer of the Board and shall exercise the executive and administrative functions of the Board with respect to the appointment and supervision of personnel employed by the Board; the distribution of business among such personnel and among administrative units of the Board; and the use and expenditure of funds. Subject to the civil service and classification laws, the Board is authorized to select, appoint, employ and fix the compensation of such officers and employees, including investigators, attorneys, and administrative law judges, as shall be necessary to carry out its powers and duties under this subsection.

(E) The Board shall—

(i) investigate (or cause to be investigated), and determine the facts, conditions, and circumstances and the cause or probable cause of any chemical spill or other accident involving the production, processing, handling or storage of chemical substances in which there is a fatality or substantial property damages;

(ii) report in writing on the facts, conditions and circumstances of each accident investigated pursuant to clause (i) and make such reports available to the public;

(iii) issue periodic reports to the Congress, Federal, State and local agencies, including the Environmental Protection Agency, concerned with the safety of chemical production, processing, handling and storage, and other interested persons recommending and advocating meaningful responses to reduce the likelihood of recurrence or the consequences of chemical accidents of a similar nature to those investigated by the Board and proposing corrective steps to make chemical production, processing,

handling and storage as safe and free from risk of injury as is possible;

(iv) recommend to the Administrator of the Environmental Protection Agency proposed rules and orders which should be issued under the authority of this subsection to prevent or minimize the consequence of the release to the air of substances as that may have an acute adverse effect on human health as a result of sudden events;

(v) upon request by the Administrator or another agency of the United States having a responsibility to protect public health and safety, conduct studies and investigations with respect to the potential for sudden, catastrophic release into the air of substances subject to section 302 of the Emergency Planning and Community Right-to-Know Act of 1986, whether or not an accidental release has occurred, where there is evidence which indicates the presence of a potential hazard or hazards;

(vi) assess and reassess techniques and methods of hazard assessment and prepare and publish from time to time recommended procedures for hazard assessment; and

(vii) establish by regulation requirements binding on persons for reporting accidents subject to the Board's investigatory jurisdiction under this subparagraph.

The Board shall coordinate its actions under clauses (i), (ii) and (v) with investigations and studies conducted by other agencies of the United States having a responsibility to protect public health and safety, but in no event shall the Board forego an investigation where an accidental spill or release involving the production, processing, handling, or storage of a chemical substance causes a fatality or serious injury among the general public.

(F) Whenever the Board submits a recommendation with respect to the safety of chemical production, processing, handling and storage to the Administrator, the Administrator shall respond to such recommendation formally and in writing not later than one hundred eighty days after receipt thereof. The response to the Board's recommendation by the Administrator shall indicate whether the Administrator will—

(i) initiate a rulemaking or issue such orders as are necessary to implement the recommendation in full, pursuant to any timetable contained in the recommendation;

(ii) initiate a rulemaking or issue such orders as are necessary to implement the recommendation in part; or

(iii) refuse to initiate a rulemaking or issue orders as recommended.

Any refusal by the Administrator to implement a recommendation of the Board in full or in part, including any variation from the schedule contained in the recommendation, shall be accompained by a statement from the Administrator setting forth the reasons for such refusal.

(G) The Board, or upon authority of the Board, any member thereof, any administrative law judge employed by or assigned to the Board, or any officer or employee duly designated by the Board, may, for the purpose of carrying out this paragraph, hold such hearings, sit and act at such times and places, administer such oaths, and require by subpoena or otherwise attendance and testimony of

such witnesses and the production of evidence as the Board or such officer or employee deems advisable.

(H) The Board, or an officer or employee of the Board duly designated, may conduct an inquiry to secure data with respect to any matter pertinent to the safety of chemical production, processing, handling, and storage upon publication of notice of such inquiry in the Federal Register and may require by order that any person engaged in the production, processing, handling, or storage of chemicals submit written reports and responses to such requests and questions as are propounded with respect to any matter pertinent to the duties and functions of the Board. Such reports and responses shall be submitted to the Board within such time and in such form as the Board may require.

(I) Any duly designated officer or employee of the Board, upon presenting appropriate credentials and a written notice of inspection authority, is authorized to enter any property wherein a substance listed pursuant to paragraph (2) is produced, processed, handled or stored and to do all things therein necessary for a proper investigation. Such officer or employee may inspect at reasonable times records, files, papers, processes, controls, and facilities and take such samples as are relevant to such investigation. Each inspection shall be commenced and completed with reasonable promptness and the results of such investigation made available.

(J) The Board is authorized to establish such procedural and administrative rules as are necessary to the exercise of its functions and duties.

(K) The Board is authorized without regard to section 5 of title 41 of the United States Code to enter into such contracts, leases, cooperative agreements or other transactions as may be necessary in the conduct of the duties and functions of the Board with any other agency, institution, organization or person.

(L) The Administrator shall provide to the Board such support and facilities as the Board determines it needs to carry out its functions.

(M) Any records, reports or information obtained by the Board under this paragraph shall be available to the public, except that upon a showing satisfactory to the Board by any persons that records, reports, or information, or particular part thereof (other than release or emissions data) to which the Board has access under this paragraph, if made public, is likely to cause substantial harm to the person's competitive position, the Board shall consider such record, report, or information or particular portion thereof confidential in accordance with section 1905 of title 18 of the United States Code, except that such record, report, or information may be disclosed to other officers, employees, and authorized representatives of the United States concerned with carrying out this Act or when relevant under any proceeding under this Act. This subparagraph does not constitute authority to withhold records, reports, or information from the Congress.

(N) The Board shall submit an annual report to the President and to the Congress which shall include, but not be limited to, information on accidents which have been investigated by or reported to the Board during the previous year, recommendations for legislative or administrative action which the Board has made, the ac-

tions which have been taken by the Administrator or the heads of other agencies to implement such recommendations, an identification of priorities for study and investigation in the succeeding year, progress in the development of risk reduction technologies and the response to and implementation of significant research findings on chemical safety in the public and private sector.

(O) There are authorized to be appropriated to carry out the provisions of this paragraph not to exceed $25,000,000 in each of the fiscal years ending September 30, 1988, 1989, 1990, 1991, and 1992.

(5) In order to prevent the release to the air of substances listed under paragraph (2) from all devices and systems (including pumps, compressors, valves, flanges, connectors, containers, and vessels) from which there may be a release of any such substance due to sudden events, the Administrator may promulgate release prevention, detection, and correction requirements which may include monitoring, recordkeeping, reporting, vapor recovery, secondary containment, and other design, equipment, work practice, and operational requirements which shall be applicable to all such devices and systems which are located at a facility which manufactures, stores, handles or processes any such substance in amounts greater than the threshold quantity specified under paragraph (2). In carrying out the authority of this paragraph, the Administrator shall consult with the Administrator of the Occupational Safety and Health Administration and seek to coordinate any requirements under this paragraph with any requirements established for comparable purposes by such Administration.

(6)(A) In addition to any other action taken, when the Administrator determines that there may be an imminent and substantial endangerment to the public health or welfare or the environment because of an actual or threatened release to the air of a substance listed under paragraph (2) from a facility, the Administrator may secure such relief as may be necessary to abate such danger or threat, and the district court of the United States in the district in which the threat occurs shall have jurisdiction to grant such relief as the public interest and the equities of the case may require. The Administrator may also, after notice to the State in which the facility is located, take other action under this paragraph including, but not limited to, issuing such orders as may be necessary to protect human health and welfare and the environment.

(B) Any person who willfully violates, or fails or refuses to comply with, any order of the Administrator under subparagraph (A) may, in an action brought in the appropriate United States district court to enforce such order, be fined not more than $25,000 for each day in which such violation occurs or failure to comply continues.

(C) Within one hundred and eighty days after enactment of this subsection, the Administrator shall publish guidance for using the order authorities established by this paragraph. Such guidance shall provide for coordination with other authorities under this Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Clean Water Act, the Solid Waste Disposal Act, and the Toxic Substances Control Act which are available for response to such releases or threatened releases.

(h) For the purposes of developing or assisting in the development of any standard, requirement or regulation, conducting any study,

or enforcing the provisions of this section, the Administrator (or a State with an approved program under subsection (e)) may require the owner or operator of any facility which emits air pollutants subject to this section or stores any substance subject to subsection (g) to monitor for the presence of such pollutant in the emissions (both point and nonpoint) from such source and in the ambient air within the vicinity of the facility, to install and maintain leak detection systems, and to keep records and make reports on the results of such monitoring and leak detection.

(i) Nothing in this section shall preclude, deny, or limit any right of any State or political subdivision thereof to adopt or enforce any regulation, requirement, or standard (including any procedural requirement) that is more stringent than a regulation, requirement, or standard in effect under this section or that applies to a substance not subject to subsection (b), (c), or (g).

FEDERAL ENFORCEMENT

SEC. 113. (a)(1) * * *

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(3) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of section 111(e) (relating to new source performance standards), [112(c)] *112* (relating to standards for hazardous emissions), or is in violation of any requirement of section 114 (relating to inspections, etc.), he may issue an order requiring such person to comply with such section or requirement, or he may bring a civil action in accordance with subsection (b).

* * * * * * *

(b) * * *

(1) * * *

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(3) violates section 111(e), *section* [112(c)] *112,* section 119(g) (as in effect before the date of the enactment of the Clean Air Act Amendments of 1977), subsection (d)(5) (relating to coal conversion), section 320 (relating to cost of certain vapor recovery), section 119 (relating to smelter orders), or any regulation under part B (relating to ozone); or

* * * * * * *

(c)(1) Any person who knowingly—

(A) violates any requirement of an applicable implementation plan (i) during any period of Federally assumed enforcement, or (ii) more than 30 days after having been notified by the Administration under subsection (a) (1) that such person is violating such requirement, or

(B) violates or fails or refuses to comply with any order under section 119 or under subsection (a) or (d) of this section, or

(C) violates section 111(e), section [112(c)] *112,* or

(D) violates any requirement of section 119(g) (as in effect before the date of the enactment of this Act, subsection (b)(7) or (d)(5) of section 120 (relating to noncompliance penalties), or any requirement of part B (relating to ozone), [shall be punished by a fine of not more than $25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after the first conviction of such person under this paragraph, punishment shall be by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.] *shall be punished by a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than three years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $100,000 per day of violation, or by imprisonment of not more than six years or by both.*

(2) Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this Act or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device, or method required to be maintained under this Act, shall upon conviction, be punished by a fine of not more than [$10,000] *$25,000* or by imprisonment for not more than six months, [or] *two years,* or by both.

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RETENTION OF STATE AUTHORITY

SEC. 116. Except as otherwise provided in sections 119 (c), (e), and (f) (as in effect before the date of the enactment of the Clean Air Act Amendments of 1977), 209, 211(c)(4), and 233 (preempting certain State regulation of moving sources) nothing in this Act shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution; except that if an emission standard or limitation is in effect under an applicable implementation plan or under section [111 or 112,] *111, 112, or 130,* such State or political subdivision may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such plan or section.

* * * * * * *

[PRIMARY NONFERROUS SMELTER ORDERS

[SEC. 119. (a)(1) Upon application by the owner or operator of a primary nonferrous smelter, a primary nonferrous smelter order under subsection (b) may be issued—

[(A) by the Administrator, after thirty days' notice to the State, or

[(B) by the State in which such sources is located, but no such order issued by the State shall take effect until the Administrator determines that such order has been issued in accordance with the requirements of this Act.

Not later than ninety days after submission by the State to the Administrator of notice of the issuance of a primary nonferrous smelter order under this section, the Administrator shall determine whether or not such order has been issued by the State in accordance with the requirements of this Act. If the Administrator determines that such order has not been issued in accordance with such requirements, he shall conduct a hearing respecting the reasonably available control technology for primary nonferrous smelters.

[(2)(A) An order issued under this section to a primary nonferrous smelter shall be referred to as a "primary nonferrous smelter order." No primary nonferrous smelter may receive both an enforcement order under section 113(d) and a primary nonferrous smelter order under this section.

[(B) Before any hearing conducted under this section, in the case of an application made by the owner or operator of a primary nonferrous smelter for a second order under this section, the applicant shall furnish the Administrator (or the State as the case may be) with a statement of the grounds on which such application is based (including all supporting documents and information). The statement of the grounds for the proposed order shall be provided by the Administrator or the State in any case in which such State or Administrator is acting on its own initiative. Such statement (including such documents and information) shall be made available to the publiic for a thirty-day period before such hearing and shall be considered as part of such hearing. No primary nonferrous smelter order may be granted unless the applicant establishes that he meets the conditions required for the issuance of such order (or the Administrator or State establishes the meeting of such conditions when acting on their own initiative).

[(C) Any decision with respect to the issuance of a primary nonferrous smelter order shall be accompanied by a concise statement of the findings and of the basis of such findings.

[(3) For the purposes of sections 110, 304, and 307 of this Act, any order issued by the State and in effect pursuant to this subsection shall become part of the applicable implementation plan.

[(b) A primary nonferrous smelter order under this section may be issued to a primary nonferrous smelter if—

[(1) such smelter is in existence on the date of the enactment of this section;

[(2) the requirement of the applicable implementation plan with respect to which the order is issued is an emission limitation or standard for sulfur oxide which is necessary and intended to be itself sufficient to enable attainment and maintenance of national primary and secondary ambient air quality standards for sulfur oxides; and

[(3) such smelter is unable to comply with such requirement by the applicable date of compliance because no means of emission limitation applicable to such smelter which will enable it to achieve compliance with such requirement has been adequately demonstrated to be reasonably available (as determined by the Administrator, taking into account the cost of compliance, nonair quality health and environmental impact, and energy consideration).

[(c)(1) A second order issued to a smelter under this section shall set forth compliance schedules containing increments of progress which require compliance with the requirement postponed as expeditiously as practicable. The increments of progress shall be limited to requiring compliance with subsection (d) and, in the case of a second order, of procuring, installing, and operating the necessary means of emission limitation as expeditiously as practicable after the Administrator determines such means have been adequately demonstrated to be reasonably available within the meaning of subsection (b)(3).

[(2) Not in excess of two primary nonferrous smelter orders may be issued under this section to any primary nonferrous smelter. The first such order issued to a smelter shall not result in the postponement of the requirement with respect to which such order is issued beyond January 1, 1983. The second such order shall not result in the postponement of such requirement beyond January 1, 1988.

[(d)(1)(A) Each primary nonferrous smelter to which an order is issued under this section shall be required to use such interim measures for the period during which such order is in effect as may be necessary in the judgment of the Administrator to assure attainment and maintenance of the national primary and secondary ambient air quality standards during such period, taking into account the aggregate effect on air quality of such order together with all variances, extensions, waivers, enforcement orders, delayed compliance orders and primary nonferrous smelter orders previously issued under this Act.

[(B) Such interim requirements shall include—

[(i) a requirement that the source to which the order applies with such reporting requirements and conduct such monitoring as the Administrator determines may be necessary, and

[(ii) such measures as the Administrator determines are necessary to avoid an imminent and substantial endangerment to health of persons.

[(C) Such interim measures shall also, except as provided in paragraph (20), include continuous emission reduction technology. The Administrator shall condition the use of any such interim measures upon the agreement of the owner or operator of the smelter—

[(i) to comply with such conditions as the Administrator determines are necessary to maximize the reliability and enforceability of such interim measures, as applied to the smelter, in attaining and maintaining the national ambient air quality standards to which the order relates, and

[(ii) to commit reasonable resources to research and development of appropriate emission control technology.

[(2) The requirement of paragraph (1) for the use of continuous emission reduction technology may be waived with respect to a particular smelter by the State or the administrator, after notice and a hearing on the record, and upon a showing by the owner or operator of the smelter that such requirement would be so costly as to necessitate permanent or prolonged temporary cessation of operations of the smelter. Upon application for such waiver, the Administrator shall be notified and shall, within ninety days, hold a hearing on the record in accordance with section 554 of title 5 of the United States Code. At such hearing the Administrator shall require the smelter involved to present information relating to any alleged cessation of operations and the detailed reasons or justifications therefor. On the basis of such hearing the Administrator shall make findings of fact as to the effect of such requirement and on the alleged cessation of operations and shall make such recommendations as he deems appropriate. Such report, findings, and recommendations shall be available to the public, and shall be taken into account by the State or the Administrator in making the decision whether or not to grant such waiver.

[(3) In order to obtain information for purposes of a waiver under paragraph (2), the Administrator may, on his own motion, conduct an investigation and use the authority of section 321.

[(4) In the case of any smelter which on the date of enactment of this section uses continuous emission reduction technology and supplemental controls and which receives an initial primary nonferrous smelter order under this section, no additional continuous emission reduction technology shall be required as a condition of such order unless the Administrator determines, at any time, after notice and public hearing, that such additional continuous emission reduction technology is adequately demonstrated to be reasonably available for the primary nonferrous smelter industry.]

* * * * * * *

INTERSTATE POLLUTION ABATEMENT

SEC. 126. (a) Each applicable implementation plan shall—

(1) require each major proposed new (or modified) source—

(A) subject to part C (relating to significant deterioration of air quality) or

(B) which may significantly contribute to levels of air pollution [in excess of the national ambient air quality standards] in any air quality control region outside the State in which such source intends to locate (or make such modification),

to provide written notice to all nearby States the air pollution levels of which may be affected by such source at least sixty days prior to the date on which commencement of construction is to be permitted by the State providing notice, and

(2) identify all major existing stationary sources which may have the impact described in paragraph (1) with respect to new or modified sources and provide notice to all nearby States of the identity of such sources not later than three months after the date of enactment of the Clean Air Act Amendments of 1977.

(b) Any State or political subdivision may petition the Administrator for a finding that any major source *or group of sources* emits or would emit any air pollutant in violation of the prohibition of section 110(a)(2)(E)(i) *or this section.* Within 60 days after receipt of any petition under this subsection and after public hearing, the Administrator shall make such a finding or deny the petition.

(c) Notwithstanding any permit which may have been granted by the State in which the source is located (or intends to locate), it shall be a violation of *this section and* the applicable implementation plan in such State—

(1) for any major proposed new (or modified) source with respect to which a finding has been made under subsection (b) to be constructed or to operate in violation of the prohibition of section [110(a)(2)(E)(i),] *110(a)(2)(E) or this section,* or

(2) for any major existing source to operate more than three months after such finding has been made with respect to it *or to continue operation in violation of subsection (d) more than two years after the date of a finding or other determination without the installation of reasonably available control technology.*

The Administrator may permit the continued operation of a source referred to in paragraph (2) beyond the expiration of such three-month period if such source complies with such emission limitations and compliance schedules (containing increments of progress) as may be provided by the Administrator to bring about compliance with the requirements contained in section [110(a) (2) (E) (i)] *110(a)(2)(E) or this section* as expeditiously as practicable, but in no case later than three years after the date of such finding. Nothing in the preceding sentence shall be construed to preclude any such source from being eligible for an enforcement order under section 113(d) after the expiration of such period during which the Administrator has permitted continuous operation.

(d) Emission of an air pollutant which, by itself or in combination, reaction, or transformation, adversely affects the public health or welfare of another State, is in violation of this section.

* * * * * * *

OUTER CONTINENTAL SHELF

SEC. 129. (a) For the purposes of assuring the attainment and maintenance of ambient air quality standards in any State, not later than 12 months after the enactment of this section, the Administrator in consultation with the Secretary of the Interior shall promulgate regulations that provide that any source of an air pollutant or pollutants resulting from an activity regulated under the authority of the Outer Continental Shelf Lands Act being performed on the Outer Continental Shelf, in the waters above the Outer Continental Shelf, or on the waters above the Outer Continental Shelf, whether such source is a stationary source or a vessel, shall meet such requirements as may be necessary to comply with subsection (c). Such regulations shall also provide for the manner in which State implementation plans under section 110 shall be modified to incorporate such requirements and account for emissions from such sources. The Administrator shall take into account the proximity of such source to the adjacent State or local jurisdiction and the degree to which all the requirements of this Act that would be applicable to such source if it were carried out in the State or local jurisdiction adjacent to such source should apply to such source. For the purposes of this section and section 110(k), the term 'Outer Continental Shelf' shall have the same meaning as that given at section 201(a) of the Outer Continental Shelf Lands Act.

(b) For the purposes of subsection (a), the adjacent State or adjacent local jurisdiction is the State or States or local jurisdiction or jurisdictions that are closest to the Outer Continental Shelf source.

The Administrator shall decide which State or States, or local jurisdiction or jurisdictions shall be considered the adjacent State or local jurisdiction.

(c) In carrying out the provisions of subsection (a), the Administrator shall assure that such sources do not prevent or interfere with the attainment or maintenance of any ambient air quality standards, including any requirements implementing such standards established by any State in its State implementation plan.

(d) In carrying out the responsibilities of subsection (a), the Administrator shall require that regulation of Outer Continental Shelf sources not be more stringent than regulation of similar non-Outer Continental Shelf sources.

(e) The Administrator shall assure that hazardous waste incineration vessels operating within the territorial waters or the Exclusive Economic Zone declared by the United States meet the same standards with respect to air emissions that would apply to such activities if they were carried out onshore.

HYDROCARBON EMISSION CONTROLS

Sec. 130. (a) Not later than two years after the enactment of this section, the Administrator shall promulgate regulations establishing emission limitations, standards of performance, or standards for product composition or application for hydrocarbon emissions associated with the following categories of sources—

(1) commercial solvents;
(2) consumer solvents;
(3) architectual coatings;
(4) pesticide application;
(5) traffic marking coatings; and
(6) metal parts coatings in military specification applications and aerospace industry applications.

(b) With respect to existing sources or activities not subject to section 111 or section 173, the regulations under this section shall require the degree of emission reduction or control, at a minimum, achievable through the adoption of reasonably available control technology, as defined in section 171(6). In developing regulations under subsection (a)(1) and (a)(6) of this section, the Administrator shall consult with the affected industry, including the industries procuring such parts, and with representatives of the Department of Defense, the Federal Aviation Administration, and the National Aeronautics and Space Administration involved in the establishment of specifications for such parts or coatings.

(c) For the purposes of this Act, any requirement of a regulation promulgated under this section shall be deemed a requirement of an applicable implementation plan.

STANDARDS FOR EMISSIONS FROM MUNICIPAL WASTE INCINERATION FACILITIES

Sec. 131. (a)(1) Not later than one year after the enactment of this section, the Administrator shall promulgate standards of performance to control emissions of air pollutants into the ambient air from each new or modified municipal waste incineration unit. The standards promulgated under this subsection shall reflect the greatest *degree of emission limitation achievable through application of the best available control technologies and practices which the Administrator determines at the time of promulgation (or revision, in the case of a revision of a standard)—*

(A) has been achieved in practice by municipal waste incineration units, excluding periods of malfunction or misoperation, or

(B) is contained in the implementation plan of any State or any permit for municipal waste incineration units, and will be implemented at such units,

whichever is more stringent. In no event shall the standards promulgated under this subsection permit a new or modified municipal waste incineration unit to emit any pollutant in excess of the amount allowable under any applicable new source standards of performance. Standards under this subsection shall be based on methods and technologies for removal or destruction of pollutants before, during, or after combustion, and shall incorporate siting requirements that minimize, on a site specific basis, to the maximum extent practicable, any potential risk to human health or the environment. The following practices and control technologies, used individually, in combination with one another, or in combination with other available practices or control technologies not identified in this paragraph, shall be deemed available for purposes of this paragraph: electostatic precipitators, fabric filtration, flue gas scrubbers, spray dry scrubbers, condensation scrubbers, source separation, source reduction, recycling, negative air flow, and good combustion practices, including availability of auxiliary fuel to maintain specific temperatures. In adopting standards of performance, the Administrator may take into consideration other technologies and practices that, either by themselves or in combination with other technologies or practices, may achieve a greater degree of emission reduction for the pollutants specified in paragraph (2)(A), including the use of selective or non-selective catalytic reduction, wet flue gas denitrification, selective non-catalytic reduction, wet scrubbing, or catalytic oxidation. The Administrator may require new facilities to be constructed according to designs which allow for addition of selective catalytic reduction, and other technologies, as they become available.

(2)(A) The standards promulgated under this subsection shall specify emission limitations for the following substances or mixtures: particulate matter (total and fine), acid gases, sulfur dioxide, oxides of nitrogen, carbon monoxide, heavy metals, lead, cadmium, halogenated organic compounds, dioxins, and dibenzofurans. In establishing such standards of performance under this subsection, the Administrator shall take into account the use of numerical standards or other methods to reduce the presence in air emissions or ash from a municipal waste incineration unit of each of the following additional substances: volatile organic compounds, mercury, beryllium, hydrogen fluoride, hydrogen, chloride, antimony, arsenic, barium, chromium, cobalt, copper, nickel, selenium, zinc, polychlorinated biphenyls, chlorobenzenes, chlorophenols, and polynuclear aromatic hydrocarbons.

(B) Standards promulgated or imposed under this subsection may be expressed in terms of post-combustion concentration of surrogate

substances or periods of residence time in excess of stated temperatures. In no event shall any such standard allow an outlet gas carbon monoxide concentration greater than 50 parts per million on an 8-hour average; an outlet gas particulate concentration greater than 0.010 grains per dry standard cubic foot corrected to 7 percent oxygen, with start-up excursions not to exceed 0.015 grains per dry standard cubic foot; an outlet gas concentration of sulfur dioxide greater than 40 parts per million, unless uncontrolled emissions of sulfur dioxide are reduced by not less than 70 percent; an outlet gas concentration of hydrogen chloride greater than 30 parts per million, unless uncontrolled hydrogen chloride emissions are reduced by not less than 90 percent; or a retention temperature and time of less than 1800 degrees Farenheit or less than 1 second at fully mixed height (or the equivalent).

(3) Standards promulgated under this subsection shall be effective no later than eighteen months after the enactment of this section. Not later than three years following the initial promulgation of such standards and at five-year intervals thereafter, the Administrator shall review and, in accordance with this subsection, revise such standards. Such revised standards shall be effective as of the date six months after the date or promulgation.

(4) After the effective date of any standard promulgated under this section, it shall be unlawful for any owner or operator of any new or modified municipal waste incineration unit to operate such unit in violation of such standard.

(b)(1) In addition to any other applicable requirements, after the date eighteen months after the enactment of this section, no permit may be issued under a State program approved under part C or part D of this Act for any new or modified municipal waste incineration unit unless the jurisdiction served by the municipal waste incineration unit (as designated by the State in accordance with section 4006 of the Solid Waste Disposal Act) has prepared, after notice and opportunity for public comment and public hearing, an enforceable solid waste management plan, in accordance with section 4003 of the Solid Waste Disposal Act, which is based on an analysis of all solid waste handling alternatives and which, to the maximum extent practicable, (A) minimizes the threat to human health and the environment from solid waste, (B) maximizes the conservation of material resources and protection of human health and the environment through solid waste reduction, source separation or control, recycling, and other measures, and (C) is cost effective, with full consideration of the cost of health and environmental harms. In the event such jurisdiction has prepared a solid waste management plan otherwise in accordance with this subsection which does not reflect the operation of a new or modified municipal waste incineration unit, no permit may be issued to such unit unless the jurisdiction, after notice and opportunity for public comment and public hearing, revises its solid waste management plan in accordance with this subsection to reflect the operation of such unit. If the State determines that a plan prepared by a local jurisdiction (designated under such section 4006) is inadequate and such plan has not been revised by such jurisdiction within six months, the State may issue a new plan or revise such plan, in accordance with this subsection.

(2) If a municipal solid waste incineration unit is proposed for construction in a location where there is evidence of elevated blood levels of lead, dioxins or other pollutants named in subsection (a)(2)(A) of this section, the Administrator or the State may require confirmatory testing of such blood levels before a permit shall issue.

(3) No permit may be issued to a municipal waste incineration unit unless an ash management plan has been submitted for the ash from such unit. Any permit issued to a new or modified municipal waste incineration unit after the date of enactment of this section shall require that prior to the commencement of construction of such unit, there is identified for such unit, through enforceable contractual commitments, specific sufficient capacity to treat or dispose of the ash from such unit in accordance with section 4011 and other applicable provisions of the Solid Waste Disposal Act.

(c) If the Administrator fails to promulgate standards under subsection (a) of this section, no permit may be granted to the owner or operator of any new or modified municipal waste incineration unit required to obtain a permit under a State program approved under part C or part D of this Act unless such permit requires compliance with emission standards that comply with subsection (a)(2)(B).

(d) Not later than one year after the enactment of this section, the Administrator shall promulgate regulations and standards of performance to control emissions of air pollutants into the ambient air from each existing municipal waste incineration unit. Such standards of performance shall be established on the basis of the degrees of emission limitation achievable through application of available control technologies and practices as determined under subsection (a)(1), and shall specify emission limitations for the substances required under subsection (a)(2). In no event shall any such standard allow an outlet gas carbon monoxide concentration greater than 100 parts per million on an 8-hour average; an outlet gas particulate concentration greater than 0.015 grains per dry standard cubic foot corrected to 7 percent oxygen; an outlet gas concentration of sulfur dioxide greater than 60 parts per million, unless uncontrolled emissions of sulfur dioxide are reduced by 70 percent; an outlet gas concentration of hydrogen chloride of 45 parts per million, unless uncontrolled emissions of hydrogen chloride are reduced by 90 percent; or a retention temperature and time of less than 1,800 degrees Farenheit or less than 1 second at fully mixed height (or the equivalent). The Administrator is authorized to establish a standard allowing an outlet gas carbon monoxide concentration no greater than 200 parts per million on an 8-hour average, for any existing municipal waste incineration unit that controls emissions of dioxins and dibenzofurans using acid gas scrubber and fabric filtration control technology. The Administrator shall promulgate a schedule for compliance with these standards and, to the maximum extent practicable, with other standards set forth under this section. In no event shall such schedule provide for compliance with such standards later than the date six years after the enactment of this section. No less often than every five years, the Administrator shall review and, in accordance with this subsection, revise as necessary such standards.

(e)(1) The Administrator shall promulgate regulations requiring the owner or operator of each municipal waste incineration unit to

monitor emissions from the unit at the point at which such emissions are emitted into the ambient air and at such other points as necessary to protect human health and the environment and to report the results of such monitoring. Such regulations shall contain provisions regarding the frequency of monitoring, test methods and procedures, and the form and frequency of reports containing the results of monitoring. Such regulations shall require that copies of the results of such monitoring be maintained on file at the facility concerned and that such copies shall be made available for inspection by interested members of the public during business hours.

(2) The Administrator shall promulgate the regulations required under this subsection within twelve months after the enactment of this section. Such regulations may be revised from time to time in accordance with paragraph (1). Except as provided in paragraph (3), the requirements of this subsection shall take effect—

(A) upon commencement of operation of any new or modified unit; and

(B) eighteen months after the enactment of this part in the case of any existing municipal waste incineration unit.

(3)(A) The regulations promulgated under this subsecton shall, at a minimum, require continuous monitoring for the following: opacity, hydrogen chloride (if such monitoring device or method is available), sulfur dioxide, oxides of nitrogen, carbon monoxide, caron dioxide, oxygen, stack temeprature, and furnace temperature (or secondary combustion zone temperature, as appropriate).

(B) For all emissions subject to standards under this section that are not subject to continuous monitoring under subparagraph (A), the regulations promulgated under this subsection shall require periodic monitoring of such emissions at each municipal waste incineration unit not less frequently than—

(i) every six months, or

(ii) six months after commencement of operations, and every eighteen months thereafter if the owner or operator of such unit demonstrates that such unit has complied with all applicable emissions standards as of the commencement of operations and during the previous periods of monitoring and maintains compliance with all applicable emissions standards during each interval between monitoring.

(C) The initial monitoring under this subsection shall commence at the later of the following:

(i) The date six months after the promulgation of regulations under this subsection.

(ii) The commencement of operation of the unit concerned.

(4)(A) The regulations required by this subsection may require the owner or operator of each municipal waste incineration unit to establish and operate, or to pay the costs of establishing and operating, a program to detect impacts of the unit, or any associated releases, on the environment or humans. Such program shall require periodic testing for and public reporting of the presence of waste constituents or contaminants (or indicators thereof) at statistically significant levels.

(B) In any case in which exposure to municipal waste incineration unit emissions or ash may pose a potential risk to human health, the Administrator or the State may request the Administrator of the

Agency for Toxic Substances and Disease Registry to conduct a health assessment in connection with the unit and such other health studies or surveillance as may be warranted, as authorized under section 104(i) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. Such studies may include programs to detect changes in human blood or tissue concentrations of various pollutants, including, but not limited to, lead, mercury, cadmium, halogenated hydrocarbons, and dioxins in any area affected by incineration unit emissions or ash.

(f) Notwithstanding any other provision of this Act, each permit for a municipal waste incineration unit issued under part C or part D of this Act shall be reviewed every five years after date of issuance or reissuance and shall be modified as necessary to assure that the facility continues to comply with currently applicable requirements under this section. Nothing in this subsection shall prevent the Administrator or a State from reviewing and modifying a permit at any time during its term. Review of any permit shall consider improvements in the state of control and measurement technologies as well as changes in applicable regulations. No permit for a municipal waste incineration unit may be issued under this Act by an agency, instrumentality or person (other than a Governor) that is also responsible, in whole or part, for the design and construction or operation of the unit.

(g)(1) Nothing in this section shall diminish or otherwise affect any authority to establish and enforce standards under section 111 or 112 or under any other authority of law for emissions from municipal waste incineration units of any air pollutant not referred to in subsection (a). With respect to emissions from municipal waste incineration units of any air pollutant referred to in subsection (a)—

> *(A) Nothing in this section shall diminish the authority of the Administrator to promulgate more stringent standards under section 112 or any other provision of this Act.*
>
> *(B) Nothing in this section shall diminish the authority of the Administrator or a State to establish any other requirements under any other authority of law, including the authority to establish for any such air pollutant a national ambient air quality standard. No requirement of an applicable implementation plan under section 165 (relating to construction of facilities in regions identified pursuant to section 107(d)(1) (D) or (E)) or under section 172(b)(6) (relating to permits for construction and operation in nonattainment areas) may be used to weaken the standards in effect under this section.*

(2) Nothing in this Act shall be construed, interpreted, or applied to preempt, supplant, or displace other State or Federal law, whether statutory or common.

(h) Any State may submit to the Administrator a proposed State program for concurrent enforcement of the requirements of this section. After ninety days after submission to the Administrator, the State shall be treated as authorized to enforce the requirements of this section in such State unless the Administrator determines that the State program does not provide enforcement equivalent to Federal enforcement under this Act. Whenever the Administrator determines that a State is not enforcing the requirements of this section

in a manner equivalent to Federal enforcement, the Administrator shall withdraw the authorization for such State.

(i) Nothing in this section shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce any regulation, requirement, or standard relating to municipal waste incineration units that is more stringent than a regulation, requirement, or standard in effect under this section under any authority of State law or under any other provision of this Act.

(j) For purposes of sections 111(e), 113, 114, 116, 120, 304, and 307 each standard and other requirement promulgated under this section shall be treated in the same manner as a standard of performance under section 111 which is an emission limitation and each requirement of a State plan authorized under this section shall be treated as a requirement of an applicable implementation plan.

(k) As used in this section—

(1) The term "municipal waste incineration unit" means a distinct operating unit of any facility at which the combustion of any solid waste material collected from commercial or industrial establishments or the general public (including single and multiple residences, hotels, and motels) occurs. Such term does not include incinerators or other facilities required to have a permit under section 3005 of the Solid Waste Disposal Act. The Administrator may promulgate separate standards for hospital incineration units.

(2) The term "new municipal waste incineration unit" means a municipal waste incineration unit (A) not in operation on or before January 1, 1988, and the construction of which has not been substantially completed by January 1, 1988, or (B) effective January 1, 1992, which had commenced operation 20 years or more previously. Facilities shall be considered to be substantially completed if the addition of required pollution control equipment will cost more than twice what such equipment would have cost had it been constructed as part of the permitted design.

(3) The term "modified municipal waste incineration unit" means a municipal waste incineration unit at which modifications have occurred after the effective date of a standard under subsection (a) if the cumulative cost of the modifications, over the life of the unit, exceed 50 per centum of the original cost of construction and installation of the unit (not including the cost of any land purchased in connection with such construction or installation).

(4) The term "existing municipal waste incineration unit" means a municipal waste unit which is not a new or modified municipal waste incineration unit.

(5) The term "enforceable solid waste management plan" means a plan adopted by the State or local government identified under section 4006(b) of the Solid Waste Disposal Act, containing provisions with the force and effect of law or to which the appropriate unit of government is contractually committed, which require, to the extent practicable—

(A) The elimination or reduction of specific wastes or waste constituents from municipal waste prior to land disposal or incineration, to (i) reduce the risk to human health

or the environment posed by any such waste or constituent or its byproducts (whether combustion or otherwise) when present in land disposal, incineration emissions, or incinerator ash, or (ii) facilitate the utilization of safer treatment, storage or disposal alternatives. Such provisions may include limitations on the composition (including inks or pigments) of locally produced products or prohibitions on disposal of certain items in municipal waste.

(B) The separation of wastes at their source or prior to incineration or land disposal to allow the separate treatment and disposal of such waste, including batteries, cathode ray tubes and other concentrated or specialized sources of pollutants identified in subsection (a)(2)(A).

(C) The return to, and acceptance by, retail merchants or their agents, for purposes of pickup and delivery, of waste items the treatment, storage or disposal of which can be more effectively or safely effected through such means.

(l)(1) Not later than one year after the enactment of this section, the Administrator shall publish guidelines identifying items or materials that should be removed from municipal waste prior to incineration, either through separation by the generator of such waste or at a central facility from the general waste stream or through limitations on the composition (including inks and pigments) of products or on the disposal of such items or materials in municipal waste.

(2) Not later than one year after the enactment of this section, the Administrator shall publish guidelines that identify items or materials that should be removed from municipal waste prior to incineration in order to reduce air emissions. The guidelines must address the type and amount of potential reductions in emissions that may be achieved through source separation.

(m) Not later than eighteen months after enactment of this section, the Administrator shall develop and promote a model State program for the training and certification of municipal waste incinerator personnel. The program shall include a requirement that all operators and management personnel achieve a passing grade on an examination on (and participate in continuing education to stay informed about) current technology for the control of pollution from municipal waste incineration units. The Administrator may authorize any State to implement a State program for the training and certification of municipal waste incinerator personnel if the State has adopted a program which is at least as stringent as the model program developed by the Administrator.

* * * * * * *

DEFINITIONS

SEC. 169. For purpose of this part—

(1) The term "major emitting facility" means any of the following stationary sources of air pollutants which emit, or have the potential to emit, one hundred tons per year or more of any air pollutant from the following types of stationary sources: fossil-fuel fired steam electric plants of more than two hundred and fifty million British thermal units per hour heat

input. Coal cleaning plants (thermal dryers), kraft pulp mills, Portland Cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than [two hundred and] fifty tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnance process) primary lead smelters, fuel conversion plants, sintering plants, secondary metal production facilities, chemical process plants, fossil-fuel boilers of more than two hundred and fifty million British thermal units per hour heat input, petroleum storage and transfer facilities with a capacity exceeding three hundred thousand barrels, taconite ore processing facilities, glass fiber processing plants, charcoal production facilities. Such term also includes any other source with the potential to emit two hundred and fifty tons per year or more of any air pollutant. This term shall not include new or modified facilities which are nonprofit health or education institutions which have been exempted by the State.

* * * * * * *

PART D—PLAN REQUIREMENTS FOR NONATTAINMENT AREAS

DEFINITIONS

SEC. 171. For the purpose of this part and section 110(a)(2)(I)—

(1) The term "reasonable further progress" means annual incremental reductions in emissions of the applicable air pollutant (including substantial reductions in the early years following approval or promulgation of plan provisions under this part and section 110(a)(2)(I) and regular reductions thereafter) which are sufficient in the judgment of the Administrator, to provide for attainment of the applicable national ambient air quality standard by the date required in section 172(a). *For nonattainment areas to which section 172(e) applies, compliance with the requirements of section 172(e)(2) and section 173 (including paragraph (1)(A) thereof) shall constitute reasonable further progress. A State or local government with responsibility for implementing an appropriate portion of an implementation plan may report compliance with section 172(e)(2) (B) and (C) at a greater interval than annually, but no less often than every three years.*

(2) The term "nonattainment area" means, for any air pollutant an area which is shown by monitored data or which is calculated by air quality modeling (or other methods determined by the Administrator to be reliable) to exceed any national ambient air quality standard for such pollutant. Such term includes any area identified under subparagraphs (A) through (C) of section 107(d)(1) *or section 107(d) (5). In the case of any nonattainment area that has been designated or identified within part of any Metropolitan Statistical Area (as defined by the Director of the Bureau of the Census), the term "nonattainment area" means the entire Metropolitan Statistical*

Area containing such nonattainment area. The Administrator may remove from a nonattainment area any county that was not within a nonattainment area designated or identified prior to enactment of the Clean Air Standards Attainment Act of 1987, that is not itself nonattainment, and that the State demonstrates is not greater than 100,000 in population and will not contribute a significant amount of emissions from stationary or mobile sources to total emissions in the nonattainment area during the attainment and maintenance period to be addressed in the implementation plan for such nonattainment area, or in the case of a country with a larger population, that the State demonstrates will not contribute such significant amount of emissions or otherwise interfere with the attainment or maintenance of the primary ambient air quality standard in any nonattainment area. Any country removed from a nonattainment area under the authority of the preceeding sentence shall not be eligible for deletion from an ozone transport region under section 178(a)(2).

(3) The term "lowest achievable emission rate" means for any source, that rate of emissions which reflects—

(A) the most stringent emission limitation which is contained in the implementation plan of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or

(B) the most stringent emission limitation included in a permit issued pursuant to this Act for a major stationary source of the same size range, type, and class (as determined by the State in accordance with any applicable regulations promulgated by the Administrator) before the application for the permit for the proposed source is complete, or.

[(B)**]** *(C)* the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent.

In no event shall the application of this term permit a proposed new or modified source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance. *At a minimum, the lowest achievable emission rate established for a proposed new or modified source shall require the use of technology or emission reduction methods equivalent to the average of the performance of the highest 10 per centum in terms of emission reduction of all sources in the same class or category. For the purposes of this paragraph, the permitting authority shall be required to review emission limitations for other major stationary sources and to identify the most stringent emission limitation if the sources are located within the State in which the proposed source will be located, the emission limitation is described in a guidance document published and distributed to the permitting authority in accordance with section 108 or 179, or the permitting authority has received actual notice of the emission limitation by a comment submitted to the permitting authority during the consideration of the permit for the proposed source or through any other means.*

(4) The terms "modifications" and "modified" mean the same as the term "modification" as used in section 111(a)(4) of this Act.

(5) The term "major stationary source" or "major emitting facility" includes each discrete operation, unit or other activity and each combination thereof that produces or may produce emissions of twenty-five tons or more per year of a pollutant or precursors of a pollutant for which the area in which such source is or will be located in a nonattainment area. For the purposes of section 110(a)(2)(I), a major stationary source does not include a resource recovery facility recovering energy from the mass burning of municipal solid waste or from refuse-derived fuel. A source is deemed to be modified for the purposes of this part if there is, or is proposed, a physical change in, or a change in the method of operation of, such source that increases its emissions by ten tons per year or more of any pollutant or precursors of a pollutant for which the area in which source is located is a nonattainment area.

(6) The term "reasonably available control technology" as used in section 172(d) means an emission limitation, standard of performance or other emission standard based on the maximum degree of reduction of emissions of the pollutant or precursors of the pollutant for which an area is a nonattainment area, that the permitting authority determines is achievable for the existing source or class of sources in the area. In establishing such emission limitation, standard of performance or emission standard, the permitting authority shall take into account the potential toxic character of such pollutant or precursor and the degree to which the nonattainment area needs further reductions in emissions to attain the national ambient air quality standards. The availability or achievability of a particular control technology shall not be determined solely on the basis of the marginal cost per ton of pollutant removed. The requirement for the adoption of reasonably available control technology shall apply to any major stationary source and to any other significant source or class of sources of emissions. With respect to stationary sources, reasonably available control technology shall be implemented and enforced through a permit system.

(7) The term "vehicle emission control inspection and maintenance program" as used in section 172(d) means a program to reduce in-use emissions of hydrocarbons, carbon monoxide, oxides of nitrogen, and diesel particulates from motor vehicles that—

(A) covers all vehicles regularly operating in the program area;

(B) includes at a minimum (i) each Metropolitan Statistical Area (as defined by the Director of the Bureau of the Census) with a population of one hundred thousand or more according to the 1985 Census, containing a nonattainment area, and (ii) each area identified under section 178(c)(1);

(C) requires annual emission testing and necessary adjustment, repair, or maintenance;

(D) requires direct inspection of components of vehicle emission control systems (including evidence of misfueling) and, where such components have been rendered inoperative, the repair or replacement of such components;

(E) requires inspection of heavy-duty vehicle exhaust for compliance with existing standards for the opacity of such exhaust;

(F) is operated on a centralized or, with respect to emission testing, computerized basis; and

(G) has a repair cost waiver in the case of failure of at least $200, or provides that any repair cost waiver limit shall apply only to costs that are not covered by a warranty under section 207.

NONATTAINMENT PLAN PROVISIONS

SEC. 172. (a)(1) The provisions of an applicable implementation plan for a State relating to attainment and maintenance of national abmient air quality standards in any nonattainment area which are required by section 110(a)(2)(I) as precondition for the construction or modification of any major stationary source in any such area on or after July 1, 1979, shall provide for attainment of each such national ambient air quality standard in each such area as expeditiously as practicable, but, in the case of national primary ambient air quality standards, no later than December 31, 1982.

(2) In the case of the national primary ambient air quality standard for photochemical oxidants or carbon monoxide (or both) if the State demonstrates to the satisfaction of the Administrator (on or before the time required for submission of such plan) that such attainment is not possible in an area with respect to either or both of such pollutants within the period prior to December 31, 1982, despite the implementation of all reasonably available measures, such provisions shall provide for the attainment of the national primary standard for the pollutant (or pollutants) with respect to which such demonstration is made, as expeditiously as practicable but not later than December 31, 1987.

(3) In the case of a nonattainment area that has been unable to attain the national primary ambient air quality standard for photochemical oxidants (ozone) or carbon monoxide (or both) by the date of enactment of this paragraph, despite good faith efforts to comply with this part and to implement all measures in approved or submitted implementation plans, the State may submit a revised implementation plan for such area in accordance with subsections (b), (c), and (d) that provides for the attainment of the national primary ambient air quality standard as expeditiously as practicable but not later than December 31, 1992.

* * * * * * *

(c)*(1)* In the case of a State plan revision required under the Clean Air Act Amendments of 1977 to be submitted before July 1, 1982, by reason of a demonstration under subsection (a)(2), effective on such date such plan shall contain enforceable measures to assure attainment of the applicable standard not later than December 31, 1987.

(2) In order to submit a revised implementation plan under subsection (a)(3) or subsection (e), a State must submit—

(A) not later than three months after the date of enactment of this paragraph, a commitment in writing, signed by the Governor and the principal elected official of each local government or air pollution control agency with a formal role under State law in the development of implementation plans, that the State will submit a revised implementation plan in accordance with this section; and

(B) not later than December 31, 1989, a revised implementation plan in accordance with this section.

Any such revised implementation plan shall address the maintenance of the national primary ambient air quality standard during the period after such area attains such standard, for a period not less than twenty years after the enactment of this paragraph.

(d)(1) In addition to the provisions required by subsections (a) and (b), an implementation plan complying with subsection (a)(3) must require:

(A) the operation of a vehicle emission control inspection and maintenance program;

(B) the operation of systems for gasoline vapor recovery of hydrocarbon emissions emanating from the fueling of motor vehicles, in photochemical oxidant (ozone) nonattainment areas required to have vehicle emission control inspection and maintenance programs;

(C) a specific schedule for requiring or otherwise implementing the use of alternative fuels or power sources with lower emission characteristics, with respect to the pollutant or precursors of the pollutant for which the area is nonattainment, for all centrally fueled fleets comprising fifty or more vehicles operating in the nonattainment area, including light-duty and heavy-duty vehicles, whether such fleets are commonly owned or centrally dispatched or operated, and including all such fleets for which central fueling facilities are provided in the implementation of this subparagraph, where such vehicles are operating solely within the nonattainment area or within refueling range of such alternative fuels or power sources;

(D) reduction in emissions of hydrocarbons and oxides of nitrogen from existing sources in any photochemical oxidant (ozone) nonattainment area through the adoption, at a minimum, of reasonably available control technology;

(E) that no requirement under section 110 or this part for reductions in emissions for existing sources may be met or complied with through reductions in emissions at other sources;

(F) compliance by new or modified major stationary sources within the nonattainment area with the lowest achievable emission rate;

(G) the adoption of reasonably available control technology for categories identified by a regional commission under section 178;

(H) the adoption of enforceable contingency measures to be immediately implemented in the case of a waiver or delay by the Administrator under section 176(e), which shall include, at a minimum, a requirement that each source that produces or

may produce emissions of ten tons or more per year of a pollutant or precursors of a pollutant for which the area is in nonattainment shall be deemed to be a major stationary source (except in the cases of areas subject to paragraph (2) of this subsection) within such area; and

(I) such other measures as may be necessary to provide for attainment of the applicable national primary ambient air quality standard not later than December 31, 1992.

Subparagraphs (A) and (B) shall require operation of such programs or systems not later than December 31, 1989, in the case of nonattainment areas that have any program for vehicle emission control inspection and maintenance (with respect to subparagraph (A)) or for gasoline vapor recovery for fueling of motor vehicles (with respect to subparagraph (B)) as an element of an approved or submitted implementation plan as of the date of enactment of this section, or not later than December 31, 1990, in any other case.

(2) In the case of an ozone nonattainment area not part of an ozone transport region under section 178, in which the fourth highest daily maximum one-hour average concentration of ozone during the most recent three years for which there is adequate information does not exceed 0.14 parts per million, the State may submit, not later than December 31, 1988, an implementation plan in accordance with subsection (b) that complies with one or more of the specific requirements of subparagraphs (A), (B), or (C) of paragraph (1) if the State demonstrates to the satisfaction of the Administrator that the remaining requirements of the implementation plan (together with implementation of the provisions of title II, section 130, and other provisions of this Act) will result in attainment of the national primary ambient air quality standard no later than December 31, 1990.

(e)(1)(A) If a State determines prior to the submission of a commitment in writing under subsection (c)(2)(A) or the submission of a revised implementation plan under subsection (c)(2)(B) that attainment of a national primary ambient air quality standard by the date specified in subsection (a)(3) is not possible in a nonattainment area despite the implementation of the requirements of subsection (d) and all reasonably available measures (together with implementation of the provisions of title II, section 130, and other provisions of this Act), the implementation plan for such nonattainment area with respect to such standard shall comply with this subsection (including subparagraph (B)) in lieu of subsection (a)(3).

(B)(i) Each nonattainment area in which the fourth highest daily maximum one-hour average concentration of ozone during the most recent three years for which there is adequate information exceeds the national primary ambient air quality standard by more than 50 per centum but less than 125 per centum shall be presumed to be unable to attain such standard by the date specified in subsection (a)(3), unless such State submits, in accordance with this section, an implementation plan demonstrating attainment by the date specified in subsection (a)(3). The State shall submit and implement an implementation plan for each such area, and may submit and implement an implementation plan for any other area for which the State makes a determination under subparagraph (A), which plan is in accordance with this subsection and which demonstrates attain-

ment as expeditiously as practicable, but not later than December 31, 1997.

(ii) Each nonattainment area in which the fourth highest daily maximum one-hour average concentration of ozone during the most recent three years for which there is adequate information exceeds the national primary ambient air quality standard by more than 125 per centum shall be presumed to be unable to attain such standard by the date specified, and the State shall submit and implement an implementation plan for each such area, which plan is in accordance with this subsection and which demonstrates attainment as expeditiously as practicable, but not later than December 31, 2002. The State may submit an implementation plan for such area which is otherwise in accordance with this subsection but does not demonstrate attainment by December 31, 2002, if such implementation plan contains provisions (including actions to be carried out within five years) assuring that by December 31, 1997, passenger vehicle occupancy on the highways of such area will exceed 1.5 persons per vehicle and emission standards or limitations for engines in stationary or other non-vehicular use and for off-road vehicles shall be at least as stringent as those in effect for light-duty motor vehicles, and by December 31, 1997, not less than 15 per centum, and by December 31, 2002, not less than 40 per centum of the total registered motor vehicle fleet shall have been converted to alternative fuels or power sources with lower emission characteristics, and by December 31, 1990, emissions associated with new and existing commercial and residential sources which generate one ton or more per year of a pollutant or precursor of a pollutant for which the area is in nonattainment are regulated and reduced to the maximum extent practicable.

(C) The requirements of paragraph (2) of this subsection shall not apply in the case of Rhode Island if the State demonstrates to the satisfaction of the Administrator and the commission for the region established by section 178(a)(1)(A) that the control measures implemented under subsection (d) in such nonattainment area, together with the control measures required throughout the region under section 178 and the control measures required in other nonattainment areas under this subsection and subsection (d), provide for attainment in such nonattainment area by the date specified in subsection (a)(3), or in any event, a date not later than such standard would have been attained through the implementation in such nonattainment area of the requirements of paragraph (2).

(2) In addition to the requirements of subsection (d) (other than paragraph (1)(I)), an implementation plan for a nonattainment area complying with this subsection shall require:

(A) the identification and adoption of specific enforceable strategies and transportation control measures to offset any growth in vehicle miles traveled in such nonattainment area, or to offset any increases in emissions associated with such growth in vehicle miles traveled, and to attain reductions in mobile source emissions as necessary to comply with subparagraph (B). The State shall consider, at a minimum, the following measures and if the State fails to include any measure, the implementation plan shall contain an explanation of why such meas-

ure was not adopted and what emissions reduction measure was adopted to provide a comparable reduction in emissions:

(i) programs for improved public transit;

(ii) requirements for the conversion of fleet vehicles to cleaner engines or fuels, or to otherwise control fleet vehicle operations, and to control growth in the numbers of vehicles-for-hire and to reduce the number of vehicle miles traveled by such vehicles in areas of high emission concentration;

(iii) limitation of certain roads or lanes to common carriers or to high occupancy vehicles;

(iv) requirements for major employer participation in programs to encourage use of public transit and multiple occupancy vehicles, and in programs providing alternative work hours (including staggered hours and the compressed work week);

(v) traffic flow improvements;

(vi) programs for areawide ridesharing; and

(vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use.

In considering such measures, the State shall seek to assure adequate commuter access to downtown areas and to avoid measures that merely relocate emission concentrations to other areas.

(B) in the case of a nonattainment area for photochemical oxidants (ozone), a reduction in emissions of hydrocarbons (measured as volatile organic compounds) and of oxides of nitrogen, and in the case of a nonattainment area for carbon monoxide, a reduction in emissions of carbon monoxide, from the total emissions of such pollutant in such area during 1987 (or the most recent previous year for which there is an emissions inventory approved by the Administrator), so that at the end of 1991 the total reduction equals 33 per centum of the emissions in the inventory, at the end of 1994 the total reduction equals 50 per centum of the emissions in the inventory, and at the end of 1997 the total reduction equals 65 per centum of the emissions in the inventory, and so that at the end of each three years thereafter until the area is in attainment there is an additional reduction of 15 per centum of the emissions remaining in the inventory. A State may substitute in the implementation plan for 65 per centum at the end of 1997 the percentage the State demonstrates will be adequate to attain the national primary ambient air quality standard in such area as expeditiously as practicable but not later than ten years after the date of enactment of this subsection. The percentage requirements for 1991 and 1994 shall be adjusted in proportion to the percentage substituted under the previous sentence. In no event may a percentage be substituted that results in a total reduction in emissions less than 5 per centum of the emissions remaining in the inventory for each year after 1987 until the area is in attainment. an area may receive credit toward compliance with this subparagraph (B) for reductions in emissions due to the operation of systems for gasoline vapor recovery hydrocarbon emissions from

the fueling of motor vehicles and to standards authorized under section 209(b) or 211(c)(4), required or adopted prior to January 1, 1988.

(C) in the case of each nonattainment area with an emission reduction requirement established by subparagraph (B), a reduction in emissions of hydrocarbons, oxides of nitrogen, or carbon monoxide from each major stationary source in such area from the emissions of such pollutant by such source during 1987 (or the most recent previous year for which there is an emissions inventory or record acceptable to the Administrator), so that at the end of 1991, 1994, and 1997 there is achieved a reduction in emissions at least equal to the percentage required for the area under subparagraph (B) for that year. A source may receive credit toward compliance with this subparagraph (C) for reductions in emissions made in coming into compliance during or after 1982 with emission reduction requirements based on reasonably available control technology and the lowest achievable emission rate.

(D) the adoption and enforcement of a fee of not less than $100 per ton of hydrocarbons, oxides of nitrogen, or carbon monoxide emitted by each stationary source in a nonattainment area subject to reasonably available control technology or other emission reduction requirements, commencing not later than January 1, 1993.

(E) the adoption and enforcement of an excess emissions penalty set and collected in accordance with paragraph (3) for each source that fails to comply with the requirements of subparagraph (C).

(F) a binding commitment by the State transportation agency and all local public transit and transportation planning agencies to implement section 174(b) and section 176 (c) and (d).

(3)(A) An excess emissions penalty shall be the amount per ton of any pollutant emitted by a major stationary source in excess of that allowed by paragraph (2)(C) equal to the cost per ton of pollutant removed that the owner or operator of such source would have expended in order to comply with such paragraph, or the economic value that a delay in compliance would have to such owner or operator (including the capital costs of compliance and debt service over a normal amortization period, operation and maintenance costs of foregone as a result of noncompliance, and any other economic value such a delay may have for the owner or operator), whichever is greater. Such excess emissions penalty shall be $5,000 per ton until another penalty is set with respect to a particular source but in no event shall such an excess emissions penalty be less than $5,000 per ton.

(B) The air pollution control agency or other entity collecting the fees and excess emissions penalties required by paragraph (2) (D) and (E) shall retain such funds, which shall be used for air pollution control programs in areas covered by this part, including the funding of improvements to public transit related to air quality improvement or maintenance. In the event the Administrator is implementing the provisions of such paragraph in any nonattainment area, the Administrator is authorized to retain any funds collected, and all amounts collected by the Administrator shall be deposited

into a special fund of the Treasury entitled "Air Enforcement and Related Services" which shall thereafter be available for appropriation to carry out activities under this Act.

PERMIT REQUIREMENTS

SEC. 173. The permit program required by section 172(b)(6) shall provide that permits to construct and operate may be issued if—

(1) the permitting agency determines that—

(A) by the time the source is to commence operation, total allowable emissions from existing sources in the region, from new or modified sources which are not major emitting facilities, and from the proposed source will be sufficiently less than total emissions from existing sources allowed under the applicable implementation plan prior to the application for such permit to construct or modify so as to represent (when considered together with the plan provisions required under section 172) reasonable further progress (as defined in section 171); or

(B) that emissions of such pollutant resulting from the proposed new or modified major stationary source will not cause or contribute to emissions levels which exceed the allowance permitted for such pollutant for such area from new or modified major stationary sources under section 172(b);

(2) the proposed source is required to comply with the lowest achievable emission rate;

(3) the owner or operator of the proposed new or modified source has demonstrated that all major stationary sources owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in such State are subject to emission limitations and are in compliance, or on a schedule for compliance, with all applicable emission limitations and standards under this Act; and

(4) the applicable implementation plan is being carried out for the nonattainment area in which the proposed source is to be constructed or modified in accordance with the requirements of this part.

Any emission reductions required as a precondition of the issuance of a permit under paragraph (1)(A) *or under the following sentence* shall be legally binding before such permit may be issued. *In the case of a nonattainment area that qualifies under section 172(e), the amount of emissions from any proposed source shall be offset by reductions in the emissions of such pollutant from other sources in such nonattainment area, and the amount of such offsetting emission reductions shall be at least two times as great as the amount of allowable emissions from such proposed sources.*

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ENVIRONMENTAL PROTECTION AGENCY GRANTS

SEC. 175 (a) * * *

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(c) The Administrator may make grants under this section to any State for payment of reasonable costs of developing a plan revision under this part or a plan to implement a newly promulgated or revised national ambient air quality standard under section 110.

(d) The Administrator shall make grants to nonprofit organizations in any nonattainment area to provide technical assistance to such organizations to facilitate the participation of such organizations in the revision of any implementation plan under this part and the selection of control measures.

(e) There are authorized to be appropriated to carry out this section $75,000,000 to be available until expended.

LIMITATIONS ON CERTAIN FEDERAL ASSISTANCE

[SEC. 176. (a) The Administrator shall not approve any projects or award any grants authorized by this Act and the Secretary of Transportation shall not approve any projects or award any grants under title 23, United States Code, other than for safety, mass transit, or transportation improvement projects related to air quality improvement or maintenance, in any air quality control region—

[(1) in which any national primary ambient air quality standard has not been attained.

[(2) where transportation control measures are necessary for the attainment of such standard, and

[(3) where the Administrator finds after July 1, 1979, that the Governor has not submitted an implementation plan which considers each of the elements required by section 172 or that reasonable efforts toward submitting such an implemention plan are not being made (or, after July 1, 1982, in the case of an implementation plan revision required under section 172 to be submitted before July 1, 1982).

[(b) In any area in which the State or, as the case may be, the general purpose local government or governments or any regional agency designated by such general purpose local governments for such purpose, is not implementing any requirement of an approved or promulgated plan under section 110, including any requirement for a revised implementation plan under this part, the Administrator shall not make any grants under this Act.]

SEC. 176. (a) The Secretary of Transportation shall not approve any projects or award any grants under title 23, United States Code, other than for safety, mass transit, or transportation improvement projects related to air quality improvement or maintenance, in any nonattainment area for which—

(1) the date for attainment of the primary national ambient air quality standard established under section 172(a)(3), section 172(d)(2), or section 172(e)(1)(B) is past and such area remains nonattainment (unless otherwise provided under section 172(e)(1)(C));

(2) the State has not submitted a plan that meets the requirements of section 172(b)(11)(B), section 172(d), section 173, and if applicable, section 172(e); or

(3) the State or a local government with responsibility to implement a portion of the plan is not implementing each require-

ment of a plan adopted or promulgated in accordance with section 172 and each requirement promulgated under section 130.

(b) The introduction of any pollutant into a publicly-owned sewage treatment works with a permit under section 402 of the Clean Water Act (as such terms are defined in such Act), by a source not utilizing such treatment works prior to a violation described in paragraph (1) or (2) of this subsection, is prohibited in any nonattainment area for which—

(1) the State has not submitted a plan that meets the requirements of section 172(e), if applicable; or

(2) the State or a local government with responsibility to implement a portion of the plan is not implementing the requirements of the plan in accordance with section 172(e)(2) (B), (C), (D), or (E) or the last sentence of section 173.

The prohibition of this section shall be deemed a requirement of an applicable implementation plan. The Administrator shall proceed in any court of competent jurisdiction to enforce this subsection. The owner or operator of a publicly-owned treatment works may raise as an affirmative defense that the applicable State implementation plan expressly quantifies and provides for the increase in emissions which may reasonably be anticipated to result, directly or indirectly, from the source proposing such introduction and requires that before such introduction is allowed such increase in emissions shall be offset by reductions in emissions from other sources in such nonattainment area, and the amount of such offsetting emission reductions shall be at least four times as great as the expected increase in emissions, and that such provisions are being implemented. For the purpose of the preceding sentence, an increase in emissions shall include any emissions associated with such source, directly or indirectly, from mobile sources, stationary sources, and areawide and nonmajor stationary source growth (mobile and stationary). The trier of fact shall determine whether such defense has been proven.

(c) * * *

(d) * * *

(e)(1) The Administrator is authorized to waive or delay the application, in whole or in part, of the provisions of subsection (a)(1) or section 110(a)(2)(I)(i) in the case of any ozone nonattainment area for which the Administrator determines that all good faith efforts have been made to attain the primary national ambient air quality standard by the applicable date, including the submission and approval of a revised implementation plan that complies with this part and the implementation of all measures and requirements contained in such plan in a timely manner. In any such case, the Administrator shall require the State to implement at the earliest possible time the measures adopted under section 172(d)(1)(H), which shall include the requirements of section 172(d)(1) (in the case of areas subject to section 172(d)(2)) or of sections 172(e)(2) and 173 (in the case of areas subject to section 172(a)(3)), or (in the case of areas subject to section 172(e)(1)(B)) such additional measures and requirements as may be necessary to assure attainment as expeditiously as practicable but not later than three years after the original applicable date for attainment for such area. No nonattainment area shall be eligible for a waiver or delay under the preceding two sentences beyond the next applicable attainment date specified in section

172(a)(3) or the date three years after the original applicable date for attainment for such area, whichever is earlier. The Administrator shall act to grant or deny such waiver or delay not later than four months after receipt of such request.

(2) In determining good faith with respect to an ozone nonattainment area, the Administrator shall consider—

(A) whether implementation of the plan has led to actual reductions in emissions of at least 90 per centum of the reduction in the inventory specified in the revised implementation plan as needed to reach attainment (other than that portion of the reduction in the inventory attributed in such plan to reductions of emissions under title II or section 130), as determined by appropriate means of measurement, including stack monitors where feasible;

(B) whether, in any area alleging that its failure to attain the standard is a result of transport of a pollutant or precursor of a pollutant for which such area is in nonattainment, the area and the State in which it is located have pursued the remedies available under sections 110(a)(2)(E) and 126;

(C) whether implementation of the plan has led to actual improvements in air quality, based on monitoring data, demonstrating timely progress toward attainment of the national ambient air quality standard; and

(D) the extent to which the failure of the area to attain the standard is the result of unanticipated factors which could not have reasonably been foreseen and the consequences of which could not have reasonably been taken into account in the implementation plan developed by the State. Previously recorded variations in weather are deemed to be foreseeable and shall be addressed in the implementation plan.

(3) The Administrator, upon receipt of a request from a State for a waiver or delay under this subsection, may stay the application of subsection (a)(1) and section 110(a)(2)(I)(i) for a period not to exceed six months, or until the final disposition by the Administrator of such request, whichever first occurs. In the case of such stay the State shall implement the measures adopted under section 172(d)(1)(H).

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OZONE TRANSPORT REGIONS

SEC. 178. (a)(1) For the purpose of facilitating attainment of the national primary ambient air quality standard for photochemical oxidants (ozone) in nonattainment areas affected by emissions in other areas, there are hereby established the following ozone transport regions:

(A) the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, and the District of Columbia; and

(B) the States of Illinois, Indiana, Michigan, and Wisconsin.

(2) The Administrator is authorized to establish other regions consisting of more than one State, and to add States to any of the regions established by paragraph (1). Any such State shall either con-

tain a nonattainment area or be contiguous to the portion of another State that is a nonattainment area. The Administrator shall consider each State that contains a nonattainment area or is contiguous to the portion of another State that is a nonattainment area, for inclusion in a region. A commission created by subsection (b) is authorized to delete by agreement of its members any State or one or more counties of any State from a region established by paragraph (1), if such commission determines the control of emissions in such State or counties in accordance with this section will not contribute to the attainment of such primary standard in any nonattainment area.

(b) Not later than six months after the date of enactment of this section (or not later than three months after the establishment of a region by the Administrator), there shall be established for each region established under subsection (a) a commission made up of the Governor (or a designee) of each State in the region, the Administrator (or a designee from the Agency headquarters office), the Regional Administrator for each Agency region affected by such region (or a designee), and the Federal Land Manager (or a designee) having authority over any Federal land affected by such region. Decisions of such commissions shall be by agreement of the Administrator and a majority of the State members. The Administrator shall seek to arbitrate any disputes that arise among the members of the commission.

(c)(1) Effective on the date two years after the date of enactment of this section, each area of a region established under subsection (a) that is not a nonattainment area shall comply with the requirements of section 172(d)(1) (A) (with respect to Metropolitan Statistical Areas with a population of 125,000 or more according to the 1985 census), (D) (with respect to each category of source for which reasonably available control technology control technique guidelines have been published prior to the enactment of this section), and (E). The requirements made applicable by the previous sentence shall be deemed a requirement of an applicable State implementation plan for each such area of such region. In the case of Virginia, the requirements of section 172(d)(1)(A) shall apply only to the area east of the 78th meridian and north of the 37 degree 30 minute parallel and to the Richmond-Petersburg Metropolitan Statistical Area. In the case of other States, the requirements of section 172(d)(1)(A) shall not apply to a Metropolitan Statistical Area that in its entirety is more than one hundred miles from any nonattainment area which has been determined by the Administrator to have a design value for ozone in excess of 0.12 parts per million on the basis of information for the three most recent years for which information is available as of the date of enactment.

(2) The commission established by subsection (b) shall develop an attainment strategy for the region and shall identify additional categories of sources for which reasonably available control technology shall be adopted for nonattainment areas and other areas within such region. The commission shall identify and recommend to the member States for inclusion in State implementation plans under this part and section 110, such other measures as may contribute to the attainment of the national primary ambient air quality standard for photochemical oxidants (ozone) for nonattainment areas in

such region. Failure to incorporate into a State implementation plan any requirement identified under this paragraph within one year of such identification shall constitute a notice of plan inadequacy under section 110(a)(2)(H).

(d) The Administrator, in reviewing and approving State implementation plans submitted in accordance with this part, shall seek to assure that emissions arising in the State for which the implementation plan is submitted do not prevent the attainment or maintenance of a national primary ambient air quality standard in any other State.

GUIDANCE DOCUMENTS

SEC. [178.] *179.* The Administrator shall issue guidance documents under section 108 for purposes of assisting States in implementing requirements of this part respecting the lowest achievable emission rate. Such a document shall be published not later than nine months after the date of enactment of this part and shall be revised at least every two years thereafter.

PART E—INTERSTATE TRANSPORTATION AND ACID PRECURSOR REDUCTION

FINDINGS AND PURPOSES

SEC. 180. (a) The Congress finds that—

(1) the long-range transport of pollutants and their transformation products is an interstate and international problem;

(2) current levels of emissions of air pollutants from existing sources as well as increased emissions from new and existing sources threaten public health and welfare and the environment in States and countries other than those in which emitted;

(3) reduction of total regional atmospheric loading of pollutants such as sulfur oxides and nitrogen oxides will enhance protection of public health and welfare and the environment;

(4) more effective regulation of the interstate transport of air pollutants is needed in order to protect the health and welfare of the citizens of downwind States and the economic growth opportunities downwind States; and

(5) in particular—

(A) the deposition of acid compounds from the atmosphere is causing and contributing to widespread long-term ecosystem degradation;

(B) the principal source of the acid compounds in the atmosphere, and their precursors, is the combination of fossil fuels;

(C) the problem of acid deposition is of national and international significance and cannot be addressed adequately without Federal intervention;

(D) control strategies and technology for precursors to acid deposition exist now that are economically feasible; and

(E) current and future generations of Americans will be more adversely affected by delayed action, so that efforts to remedy the problem should commence now.

(b) The purposes of this part are to:

(1) protect public health and welfare and the environment from any actual or potential adverse effect caused by ambient concentrations or deposition of air pollutants, including the products of atmospheric transformation of pollutants; and

(2) preserve the rights and responsibilities of States to protect the public health and welfare and the environment of their citizens from air pollution originating in other States.

GOAL OF PART E

Sec. 181. There shall be achieved a reduction in annual emissions of sulfur dioxide, not later than January 1, 1993, of five million tons, not later than January 1, 1998, of ten million tons, and not later than January 1, 2000, of twelve million tons, and not later than January 1, 1996, there shall be achieved a reduction in annual emissions of oxides of nitrogen of four million tons, from the total actual annual level of such emissions between January 1, 1980, and December 31, 1980.

ACID PRECURSOR CONTROLS

Sec. 182. (a) Each State shall achieve within its borders an annual Statewide average rate of emissions of—

(1) sulfur dioxide not greater than 0.9 pounds per million British thermal units of heat input, not later than January 1, 1998, for all major stationary sources that are fossil fuel fired steam generating units, including both electric utility and nonutility units, that were in operation during any part of calendar year 1980; and

(2) oxides of nitrogen for all major stationary sources that are fossil fuel fired steam generating units, including both electric utility and nonutility untis, not greater than an annual average rate of emissions of oxides of nitrogen that is based on annual average emission rates of 1.0 pounds per million British thermal units of heat input of cyclone boilers, 0.5 pounds per million British thermal units of heat input for wall-fired boilers, and 0.4 pounds per million British thermal units of heat input for tangential-fired and other boilers, in the proportion that such boilers are of the total boiler capacity of such State, not later than January 1, 1996.

(b)(1) Not later than two years after the date of enactment of this part each State shall adopt—

(A) enforceable measures adequate to achieve the reduction in emissions required by subsection (a), applicable to each source subject to such subsection, including emission limitations and schedules of compliance for such sources and additional means of emission reduction in accordance with section 184 of this Act; and

(B) such additional enforceable measures, including, but not limited to, controls on other stationary sources in such State, as are necessary, taking into account the requirements of subsection (a), section 110, section 111, and title II of this Act, to achieve within its borders a reduction in annual emissions below the level of such emissions during calendar year 1980, of

sulfur dioxide equal to that fraction of twelve million tons that is the ratio of all the actual utility emissions in such State in excess of 0.9 pounds of sulfur dioxide per million British thermal units of heat input during calendar year 1980 (where such actual excess utility emissions in such State exceed 1,000 tons) to the total in all States of all the actual utility emissions in excess of 0.9 pounds of sulfur dioxide per million British thermal units of heat input during calendar year 1980. Such additional enforceable measures shall achieve for such State (i) its fraction of five million tons of such twelve million tons not later than January 1, 1993, (ii) its fraction of ten million tons of such twelve million tons not later than January 1, 1998, and (iii) its fraction of the total twelve million tons not later than January 1, 2000, calculated as provided in the preceding sentence. Such additional enforceable measures shall include emission limitations and schedules of compliance for such sources.

The Governor of such State shall submit such measures to the Administrator for review in accordance with paragraph (2) of this subsection.

(2) The Administrator shall approve within six months such measures submitted under paragraph (1) of this subsection if the Administrator finds that such measures (A) contain enforceable requirements for continuous emission reduction, including for each source limitations on emission rate, assumed rates of operation, and limitations on aggregate annual emissions consistent with such assumed rates of operation, (B) contain requirements for the installation and operation of continuous emission monitoring by the source and additional monitoring by enforcement agencies to assure that the emission limitations are being met, and (C) are adequate to achieve the reduction in emissions for such State required by this section within the time specified.

(3) Each emission limitation, schedule for compliance or other measure adopted and approved under this section shall be deemed a requirement of the State implementation plan approved or promulgated for such State under section 110 of this Act.

(4)(A) Not later than three years after the enactment of this part, the owner or operator of each stationary source subject to an emission limitation under this part shall certify to the State the means by which such source intends to comply with such emission limitation, identifying the extent to which it will rely on fuel substitution, installation of a system of continuous technological emission reduction, retirement of existing facilities, implementation of energy conservation measures, or a combination thereof.

(B) Not later than five years after the enactment of this part, each stationary source (i) for which certification is not provided within the time required by subparagraph (A), or (ii) that certifies that it will comply with an emission limitation established under this subsection or section 183 in whole or in part through the use of fuel substitution, shall be in compliance with such emission limitation.

(C) Not later than five years after the enactment of this part, each major stationary source that certifies pursuant to this section that it will comply with an emission limitation established under this subsection or section 183 through the installation of technological system of continuous emission reduction, the retirement of existing

facilities, the implementation of energy conservation measures, or a combination thereof, shall enter into binding contractual commitments to acquire, install, construct, or retire such system or facilities, or provide such services as needed to implement any energy conservation measure.

(D) Each stationary source subject to an emission limitation under this part shall be in compliance with such emission limitation, not later than the date specified in the measures submitted under paragraph (1) and in no event later than (i) January 1, 1998, in the case of emission limitations in compliance with subsection (a)(1), (ii) January 1, 1996, in the case of emission limitations in compliance with subsection (a)(2), (iii) January 1, 1993, in the case of emission limitations in compliance with paragraph (1)(B)(i) of this subsection, (iv) January 1, 1998, in the case of emission limitations in compliance with paragraph (1)(B)(ii) of this subsection, and (v) January 1, 2000, in the case of emission limitations in compliance with paragraph (1)(B)(iii) of this subsection. Notwithstanding the preceding sentence or any certification provided or required under subparagraph (A) of this paragraph, at any time prior to January 1, 1995, the owner or operator of a stationary source subject to an emission limitation under this subsection may file an amended certification with the State and the Administrator that such source intends to comply with such emission limitation through the installation of clean coal technology (as defined in section 192(a)). In such case, not later than January 1, 1996, the owner or operator of such stationary source shall enter into binding contractual commitments to acquire, install, or construct such clean coal technology.

(E) No major stationary source in operation before January 1, 1981, in any State with an emission reduction requirement under this section and not otherwise exercising its authority to substitute under subparagraph (F) or (G), shall increase its actual rate of emissions of sulfur dioxide or oxides of nitrogen over that experienced by such source during the calendar year 1980, unless there has been identified for such source in accordance with section 184 of this Act a simultaneous net reduction in emissions of such pollutant at one or more points in excess of the proposed increase in emission rate, and not otherwise required by a State implementation plan under section 110 or 111 of this Act or under this section or section 183 of this part. With respect to any source that increased its rate of emissions prior to the date of enactment of this part, the net reduction in emissions shall be accomplished by January 1, 1998.

(F) Any State with actual utility emissions during calendar year 1985 not exceeding 150,000 tons of sulfur dioxide per year (as determined in the National Acid Precipitation Assessment Program inventory) is authorized to substitute an annual statewide average rate of emissions of sulfur dioxide not greater than 0.9 pounds per million British thermal units, to be achieved not later than January 1, 1993, in lieu of the annual statewide average emission rate specified in subsection (a) and in lieu of the emission reductions for sulfur dioxide otherwise required by paragraph (1)(B) of this subsection. A State may make such a substitution in the enforceable measures submitted under paragraph (1). In such case, such enforceable measures shall also include provisions to assure that a total actual

annual level of emissions of sulfur dioxide in such State in excess of 250,000 tons is prohibited.

(G) Any State with actual utility emissions during calendar year 1985 not exceeding 40,000 tons of sulfur dioxide per year and over 90 percent of coal-fired utility emissions of sulfur dioxide from a single source is authorized to substitute a requirement that such source comply with the standards established under section 111(b) for new sources of such class or category as of January 1, 2003, or on and after the date thirty years following the completion of construction, whichever is earlier, in lieu of the annual statewide average emission rate specified in subsection (a) and in lieu of the emissions reductions for sulfur dioxide otherwise required by paragraph (1)(B) of this subsection. A State may make such a substitution in the enforceable measures submitted under paragraph (1). In such case, such enforceable measures shall also include provisions to assure that a total actual annual level of emissions of sulfur dioxide in such State in excess of 100,000 tons is prohibited.

(5)(A) Together with the enforceable measures submitted by a State and approved by the Administrator under this subsection, the State shall submit—

(i) an electric load forecast through January 1, 1998, that includes specific projected rates of operation for each utility; and

(ii) contingency plans that contain additional enforceable emission reduction measures that shall be implemented in the case actual electric load growth exceeds projected load growth or reductions in electric load due to energy conservation measures do not occur as expected, where such deviations from the forecast would otherwise result in a failure to meet the emission reduction required for such State under this section.

(B) Each State shall submit to the Administrator annual electric load reports for each year after the submission of such forecast that report changes in actual load from the previous calendar year. If actual electric load and the associated emissions deviate from the forecast to the extent, as determined by the Administrator, that the emission reduction requirements of this section will not be met for such State, the Administrator shall require the implementation of additional enforceable emission reduction measures, including those specified in a contingency plan submitted under subparagraph (A), to assure that such emission reduction requirements are met.

DEFAULT REQUIREMENTS AND SPECIAL RULE FOR GROWTH

SEC. 183. (a) In the case of any State that does not have enforceable measures in accordance with section 182(b)(1) approved by the Administrator within two years and six months after the date of enactment of this part the owner or operator of each fossil fuel fired steam generating unit in such State which is a major stationary source of emissions of sulfur dioxide shall comply not later than January 1, 1998, with an emission limitation for each such facility not greater than 0.9 pounds of sulfur dioxide per million British thermal units of heat input on a monthly average.

(b)(1) On and after January 1, 1998, sources of sulfur dioxide in each State shall comply with the requirements of either paragraph (2)(A) or paragraph (2)(B) of this subsection. Each State shall deter-

mine which requirements shall apply within such State, and submit enforceable measures to implement such requirements, as part of the enforceable measures adopted and submitted pursuant to section 182(b), not later than two years after the enactment of this part.

(2)(A)(i) Unless the State has adopted enforceable emission limitations meeting the requirements of clause (ii), and fossil fuel fired steam generating unit (including any utility or nonutility unit) on which construction has been completed for thirty years or more shall comply with an emission limitation not greater than 0.9 pounds of sulfur dioxide per million British thermal units of heat input on a monthly average. This paragraph shall take effect January 1, 1998.

(ii) For each year beginning January 1, 1998, the State shall further reduce emissions of sulfur dioxide attributable to sources in such State (other than sources going into operation after such date) below the aggregate emissions ceiling for such State described in subparagraph (B), by the amount determined by the State, pursuant to regulations promulgated by the administrator, to be equivalent to the emissions of sulfur dioxide from each fossil fuel steam generating unit (including any utility or nonutility unit) on which as of that year construction has been completed for thirty years or more that are in excess of 0.9 pounds of sulfur dioxide per million British thermal units of heat input on a monthly average. Emission reductions associated with units that cease operation or reduce hours of operation shall not be credited toward the reduction requirements of this subparagraph.

(B) On and after January 1, 1998, aggregate statewide emissions of sulfur dioxide shall not exceed an aggregate emissions ceiling for such State, equal to the actual annual emissions in such State between January 1, 1980, and December 31, 1980, minus the reduction in annual emissions determined under section 182(b)(1)(B).

(C) Effective January 1, 2003, each fossil fuel fired stationary source shall comply with the standards established under section 111(b) for new sources within such class or category on and after the date 40 years following the completion of construction of such source.

(c) Not later than December 31, 1989, the Administrator shall revise the standards under section 111(b) applicable to new electric utility generating units to express emissions limitations in terms of units of pollutant emitted per unit of electric energy output and to require, consistent with subsection (a)(1) of section 111, that such emissions limitations be achieved through increases in combustion, generating, and transmission efficiencies.

(d)(1) Not later than January 1, 1990, the Administrator shall propose revised standards of performance pursuant to section 111 for emissions of oxides of nitrogen from fossil fuel fired steam generating units, including both electric utility and nonutility units. Not later than January 1, 1991, the Administrator shall promulgate such revised standards of performance. Such revised standards of performance shall reflect improvements in methods for the reduction of emissions of oxides of nitrogen. The Administrator shall consider the degree to which a standard of performance approaching 0.1 pounds per million British thermal units of heat input, or less, is achievable as determined in accordance with section 111(a)(1).

(2) Not later than January 1, 1990, the Administrator shall propose standards of performance pursuant to section 111 for emissions of oxides of nitrogen from large stationary diesel and turbine engines. Not later than January 1, 1991, the Administrator shall promulgate such standards of performance.

ENFORCEABLE EMISSION REDUCTION PROGRAMS

SEC. 184. (a) For the purpose of attaining emission reductions required by section 182 of this Act or maintaining the limitation on emissions required by subsection (b)(4)(E) of such section or section 183(b)(2)(A)(ii), the following methods or programs for net emissions reduction may be used, in addition to enforceable continuous emission reduction measures, by a State or the owner or operator of a source, if emission limitations under such methods or programs are enforceable by the Federal Government, States other than those in which the emissions occur, and citizens under section 304 of this Act:

(1) programs for energy conservation where reductions in emissions can be identified with such programs;

(2) least emissions dispatch to meet electric generating demand at existing generating capacity;

(3) retirement of major stationary sources at an earlier date than provided in schedules on file with the Federal Energy Regulatory Commission, the Internal Revenue Service, or State utility regulatory agencies;

(4) trading of emission reduction requirements and actual reductions on a State or substate basis, for which States and the Administrator are authorized to establish emission banks or brokerage institutions to facilitate such trading; and

(5) precombustion cleaning of fuels.

(b) It shall be a first priority under this part to achieve the reductions in emissions required by section 182 through conservation of electricity or other energy. If the Governor of any State certifies to the Administrator, as part of the measures submitted under section 182(b), that a program encouraging or requiring the conservation of electricity or other energy will be implemented in such State and that such program will result in a reduction in emissions of sulfur dioxide or oxides of nitrogen, then such State may calculate the extent of the emissions reduction accomplished by such program of conservation, and may comply with the requirements of sections 181 and 182 by substituting such emissions reduction for a portion of the total emissions reductions attributable to the emissions rate limitations of section 182(a). Such emissions rate limitations may be adjusted to reflect such substitution.

(c) Interstate trading of emission reduction requirements and actual reductions or limitations on emissions under section 182(b)(4)(E) shall not be allowed under this part, except in the case of trading among units owned by a utility with steam generating units and a service territory in more than one State if the Administrator, in accordance with regulations and prior to the inclusion of emission limitations based on such trading in enforceable measures submitted under section 182(b), determines that such trading is fea-

sible and workable and will result in enforceable emission limitations in each affected State.

PART F—CLEAN COAL TECHNOLOGIES

FINDINGS

SEC. 190. The Congress finds that—

(a) acid deposition is a serious environmental problem in both the United States and Canada;

(b) air emissions from sources in both the United States and Canada are causing significant deposition of sulfates, nitrates and other acidic compounds on ecosystems in both nations;

(c) acid deposition is a serious transboundary problem as air pollutants emitted by sources in both nations cross their mutual border causing diplomatic as well as environmental problems;

(d) both the United States and Canada have a responsibility to assure that activities within their jurisdiction or control do not cause damage to the environment of other States;

(e) the United States and Canada have a long tradition of successfully resolving transboundary environmental problems, both through the International Joint Commission and on a government-to-government basis;

(f) the recommendations of the Special Envoys with respect to acid deposition build upon that tradition and, in combination with the long-term control program required under part E of this title, constitute an appropriate near-term effort to address the transboundary acid deposition problem; and

(g) control strategies and clean coal technologies necessary to carry out the recommendations of the Special Envoys exist now and can be deployed on a cost effective basis to reduce transboundary air pollution.

STATEMENT OF POLICY

SEC. 191. It is the purpose of this part to fully implement the recommendations of the Special Envoys with respect to acid deposition and transboundary air pollution problems and to improve relations between the United States and Canada by securing near-term reductions in the movement of air pollutants which may be precursors of acid deposition from areas within the United States to areas within Canada. To that purpose—

(a) The Secretary of Energy is directed to promote the rapid deployment of existing clean coal technologies so as to reduce total atmospheric loadings of air pollutants which may be precursors of acid deposition and the transboundary movement of such pollutants.

(b) The Administrator is directed to promote the vigorous enforcement of existing laws and regulations with respect to air pollution in a manner which is responsive to the problems of transboundary air pollution.

(c) The Secretary of State is directed to seek establishment of a bilateral advisory and consultative group on transboundary air pollution comprising both diplomatic and environmental management officials from the United States and Canada to

provide a forum for consultations on issues related to transboundary air pollution and to advise the directors of each nation's environmental program.

DEFINITIONS

SEC. 192. For purposes of this part—

(a) the term "clean coal technology" means any technology, including technologies applied at the precombustion, combustion or post-combustion stage, deployed at a new or existing facility which will achieve significant reductions in air emissions of sulfur dioxide or oxides of nitrogen associated with the utilization of coal in the generation of electricity or industrial process steam which is not in widespread use at commercial scale as of the date of enactment of this part;

(b) the term "coal" means anthracite, bituminous or subbituminous coal, lignite, or any fuel derivative thereof;

(c) the term "conventional technology" means any technology, including technologies applied at the precombustion, combustion, or post-combustion stage, which achieves a significant reduction in air emissions of sulfur dioxide or oxides of nitrogen associated with the utilization of coal in the generation of electricity or industrial process steam which is in widespread use at commercial scale on the date of enactment of this part;

(d) the term "high-sulfur coal" means coal with a heat value of ten million British thermal units per ton which has a sulfur content greater than 1 per centum sulfur by weight or coal with an equivalent or greater sulfur content after adjustment for the heat value of the coal;

(e) the term "precursors of acid deposition" means air pollutants including sulfur dioxide, sulfates, oxides of nitrogen and nitrates and their transformation products which may be deposited in a wet or dry form and which when deposited contribute to the acidification of aquatic and other ecosystems;

(f) the term "clean coal technology project" means the design, construction, or operation of equipment and facilities at the location of a specific installation which generates electricity or industrial process steam but only to the extent that the equipment and facilities are necessary to achieve emissions reduction through application of a generic clean coal technology or technologies and shall not include the design, construction, or operation of any other equipment or facilities associated with the installation which are not directly related to emissions reduction; and

(g) the term "Secretary" means the Secretary of the United States Department of Energy.

PROGRAM

SEC. 193. (a) GENERAL AUTHORITY.—The Secretary, pursuant to authority provided by the Federal Nonnuclear Energy Research and Development Act of 1974 (Public Law 93-577), acting jointly with the Administrator is authorized and directed to carry out a program for the construction and operation of facilities to acquire further experience with respect to the commercial deployment of clean coal *technologies which significantly reduce air emissions of sulfur dioxide or oxides of nitrogen resulting from the utilization of coal in the generation of electricity or industrial process steam. The Secretary and the Administrator may enter into contracts or cooperative agreements with, or provide financial assistance in the form of grants to, the owner or operator of any such facility to assure the deployment of clean coal technologies. The program established by this section shall include—*

(1) solicitations for proposed projects to deploy such technologies;

(2) selection of suitable projects from among those proposed;

(3) supervision of the construction and operation of such projects;

(4) monitoring and evaluation of the results of the projects which are conducted; and

(5) dissemination of information on the effectiveness and feasibility of the clean coal technologies which are operated.

Not later than one hundred and eighty days after the date of enactment of this part, the Secretary acting jointly with the Administrator shall publish regulations to assure the satisfactory implementation of each element of the program authorized by this part.

(b) Solicitation.—Not later than two hundred and ten days after the date of enactment of this part, the Secretary acting jointly with the Administrator shall publish a solicitation for proposals to deploy clean coal technologies which will significantly reduce air emissions of sulfur dioxide or oxides of nitrogen resulting from the utilization of coal in the generation of electricity or industrial process steam. The solicitation notice shall provide for a thirty-day application period and shall prescribe the information to be included in the proposal, including technical and economic information sufficient to permit the Secretary and the Administrator to assess the potential effectiveness and feasibility of the technology to be deployed and the reductions in air emissions of sulfur dioxide or oxides of nitrogen which can be expected to be achieved through deployment of the technology. A second solicitation shall be conducted not later than twenty-one months after the date of enactment of this part.

(c) Applications.—Any person or any public or private entity which is the owner or operator of a major source of air emissions as defined in this Act may submit an application to the Secretary and the Administrator in response to the solicitations required by subsection (c) of this section. The application shall contain a proposed deployment plan setting forth the various phases of the project and such other information as the Secretary and the Administrator may require. Such plan shall provide that the technology to be deployed will be installed and operational as expeditiously as practicable, but in no case later than thirty-six months after the date on which the project is selected for assistance by the Secretary.

(d) Selection Criteria.—The Secretary acting jointly with the Administrator may provide assistance under this part to a project which utilizes a clean coal technology, if the Secretary and the Administrator determine that the project will provide experience with respect to the operation of such technology at commercial scale and only if the project satisfies each of the following criteria—

(1) the project will utilize technology which would be appropriate for retrofit on a significant number of existing coal-fired sources of air emissions of sulfur dioxide or oxides of nitrogen;

(2) the project will contribute to a reduction in the transboundary movement of air pollutants which are precursors of acid deposition from areas within the United States to areas within Canada;

(3) the technology to be deployed will significantly reduce air emissions of sulfur dioxide or oxides of nitrogen (measured as a percentage removed) associated with coal utilization or, if providing less than significant reductions (measured as a percentage removed), the technology deployed will achieve reductions at a cost per ton of reductions which is substantially less than the cost associated with conventional technology;

(4) the technology to be deployed will result in a reduction of emissions of sulfur dioxide or oxides of nitrogen at a cost which is equal to or less than the cost of achieving comparable emission reductions with conventional technology; and

(5) the project will utilize as a feedstock coal mined in the United States and the location of the facility will be in the United States.

In selecting among projects for assistance which have similar reduction potential, both with respect to the rate of emissions and the transboundary movement of air pollutants which may be the precursors of acid deposition, the Secretary acting jointly with the Administrator shall give priority to those projects which achieve reductions at the least cost per ton of reductions achieved and which would be appropriate for retrofit at existing sources of air emissions which utilize high-sulfur coal. The Secretary and the Administrator shall assure that, consistent with the criteria of this subsection, projects are selected that represent a broad variety of coal types and reasonable geographic diversity.

(e) REVIEW BY THE ADMINISTRATOR.—The Secretary shall not select any project for assistance under this part unless the Administrator shall first have made a determination that the proposed project satisfies each of the criteria established by subsection (d) of this section.

(f) PROHIBITIONS.—The Secretary or the Administrator shall not select for assistance any project which incorporates reductions in air emissions of sulfur dioxide or oxides of nitrogen which are required according to a State implementation plan developed and approved pursuant to section 110 of this Act. The preceding sentence shall not apply to projects required wholly as a result of part E of this title. Not more than 15 per centum of the funds appropriated pursuant to this part may be committed to projects in any one State. No reductions in air emissions of sulfur dioxide or oxides of nitrogen which is achieved by a source through the deployment of clean coal technology in a project assisted under this part shall be available for banking or trading to achieve compliance with a State implementation plan by any other source of such emissions.

(g) NOTIFICATION.—The Secretary and the Administrator shall select or refuse to select a project for assistance under this section within ninety days of receiving the completed application. In the case of a refusal to select a project for assistance, the Secretary and

the Administrator shall notify the applicant within such ninety-day period of the reasons for refusal.

(h) Cost-Sharing.—In providing financial assistance under this part to a clean coal technology project, the Secretary acting jointly with the Administrator shall endeavor to enter into agreements and make other arrangements for maximum possible cost-sharing with State and local agencies, utility companies, technology vendors and other persons. Total Federal funds for any project shall not exceed 50 per centum of the cost of the project (including the entire capital cost and operating costs over a two-year period beginning on the date on which operation of the technology commences) estimated at the time of the award of such assistance. The owner or operator of the facility (or any other project sponsor) shall not be required to reimburse the United States from future revenues of the project.

(i) Further Provisions.—

(1) The Secretary may vest fee title or other property interests acquired through assistance of any clean coal technology project in any entity including the United States.

(2) Cost-sharing by the owner or operator of the facility (or other project sponsor) is required in each of the design, construction and operating phases of the project.

(3) Financial assistance for costs in excess of those estimated as of the date of the award of original financial assistance may not be provided in excess of the proportion of costs borne by the Government in the original agreement and only up to 25 per centum of the original financial assistance.

(4) Other appropriated Federal funds may not be used for cost-sharing by the owner or operator of the facility (or other project sponsor).

(5) Existing facilities, equipment and supplies or previously expended research and development funds are not cost-sharing for purposes of this part except as amortized, depreciated, or expensed in normal business practice.

(j) Reconstruction.—No project which receives financial assistance under this part shall be deemed to be a significant modification or reconstruction which would require compliance with a new source performance standard promulgated pursuant to section 111 of this Act by the source at which the project is carried out.

ADVISORY COMMITTEE

Sec. 194. (a) Not later than ninety days after the date of enactment of this part, the Secretary acting jointly with the Administrator shall establish, according to the provisions of the Federal Advisory Committee Act (5 U.S.C. app 1, et seq.), a Clean Coal Technologies Advisory Committee composed of the Secretary and the Administrator, or the Secretary's or Administrator's designees, who shall be cochairs, and ten members appointed by the Secretary and the Administrator who shall be selected from representatives of State and local governmental agencies or interstate or regional planning organizations with air pollution control responsibilities and who by their experience or technical expertise can advise, consult with, and make recommendations to the Secretary or the Administrator on matters of policy relating to the control of air emissions *which may be precursors of acid deposition and the selection of clean coal technology projects which satisfy the criteria of section 193(d) of this Act. Five members shall be selected by the Secretary and five members shall be selected by the Administrator. The Committee shall also include three representatives of Canada who shall be nominated by the Minister of Environment Canada for service on the Committee.*

(b) TERMS.—Each member of the Committee (with the exception of the Chair) shall hold office for a term of three years and members shall be eligible for reappointment.

(c) SUPPORT.—Such clerical and technical assistance as may be necessary to discharge the duties of the Committee shall be provided from personnel of the Department of Energy.

(d) COMPENSATION.—Members of the Committee (with the exception of the Chair) shall, while attending meetings or conferences of the Committee or otherwise engaged in business of the Committee, receive compensation and allowances at a rate to be fixed by the Secretary, but not exceeding the daily equivalent of the annual rate of base pay in effect for grade GS-18 of the General Schedule under section 5332 of title 5, United States Code, for each day (including travel time) during which they are engaged in the actual performance of duties vested in the Committee. While away from their homes or regular places of business in the performance of services for the Committee, members shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed expenses under section 5703(b) of title 5 of the United States Code.

(e) EXCEPTION.—Section 14(a) of the Federal Advisory Committee Act (5 U.S.C. app. 14), relating to termination, shall not apply to the Committee established by this section.

AUTHORIZATIONS

SEC. 195. (a) There are authorized to be appropriated to carry out the provisions of this part $500,000,000 in each of the fiscal years 1988, 1989, 1990, 1991, and 1992.

(b) The sums authorized by this section shall be in addition to the amounts available from the Clean Coal Technology Reserve established pursuant to Public Law 98-473.

TITLE II—EMISSION STANDARDS FOR MOVING SOURCES

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PART A—MOTOR VEHICLE EMISSION AND FUEL STANDARDS

ESTABLISHMENT OF STANDARDS

SEC. 202. (a)(1) * * *

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(3)(A) * * *

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(F) Regulations under paragraph (1) applicable to emissions of oxides of nitrogen from heavy duty vehicles and engines shall contain standards that provide that such emissions shall not exceed 4.0

grams per brake horsepower-hour for vehicles manufactured during and after model year 1991 and that such emissions shall not exceed 1.7 grams per brake horsepower-hour for vehicles manufactured during and after model year 1995. Regulations applicable to emissions of particulates from heavy-duty diesel vehicles and engines shall require that such emissions may not exceed 0.1 gram per brake horsepower-hour, beginning in model year 1991 with respect to buses, and in model year 1994 with respect to other heavy-duty diesel vehicles and engines.

(G) Regulations under paragraph (1) applicable to emissions from light-duty trucks and engines manufactured during and after model year 1990 shall contain standards that provide that such emissions may not exceed 0.5 gram per vehicle mile of oxides of nitrogen, 0.5 gram per vehicle mile of hydrocarbons, 0.08 gram per vehicle mile of particulates, and 5.0 grams per vehicle mile of carbon monoxide. Such regulations shall require that light-duty trucks and engines manufactured during and after model year 1990 comply with the standard for emissions of carbon monoxide regardless of the altitude at which they are sold. For the purposes of this subparagraph, the terms "light-duty truck" and "light-duty truck and engine" means any motor vehicle (including the engine thereof) with a gross vehicle weight (as determined under regulations promulgated by the Administrator) of eight thousand five hundred pounds or less and a curb weight of six thousand pounds or less (as determined under regulations promulgated by the Administrator) and which—

(i) is designed primarily for purposes of transportation of property or is a derivation of such a vehicle,

(ii) is designed primarily for transportation of persons and has a capacity of more than twelve persons, or

(iii) has special features enabling off-street or off-highway operation and use.

For the purposes of this section, any motor vehicle with a gross vehicle weight of six thousand pounds or less shall be a light-duty vehicle.

[(F)**]** *(H)* For purposes of this paragraph, motorcycles and motorcycle engines shall be treated in the same manner as heavy-duty vehicles and engines (except as otherwise permitted under section 206(f)(1)) unless the Administrator promulgates a rule reclassifying motorcycles as light-duty vehicles within the meaning of this section or unless the Administrator promulgates regulations under subsection (a) applying standards applicable to the emission of air pollutants from motorcycles as a separate class or category. In any case in which such standards are promulgated for such emissions from motorcycles as a separate class or category, the Administrator, in promulgating such standards, shall consider the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles to the maximum extent practicable. *Regulations under this section applicable to exhaust and evaporative emissions from motorcycles and motorcycle engines manufactured during and after model year 1992 shall contain standards that provide that such emissions, in the case of motorcycle engines with a displacement of less than 700 cubic centimeters, may not exceed 2.0 grams per vehicle mile of hydrocarbons, 17.6 grams per vehicle mile of carbon monoxide, and 2.0 grams per test of evaporative emissions,* *and in the case of motorcycle engines with a displacement of 700 cubic centimeters or more, may not exceed 3.6 grams per vehicle mile of hydrocarbons, 17.6 grams per vehicle mile of carbon monoxide, and 4.0 grams per test of evaporate emissions.*

(I) The Administrator shall promulgate regulations under subsection (1) applicable to emissions of formaldehyde (i) from heavy-duty vehicles and engines and (ii) from light-duty trucks and engines manufactured during and after model year 1991 which may be fueled, in whole or in part, by fuels other than gasoline. In no event may such regulations permit emissions of formaldehyde at a higher rate than from comparable gasoline-fueled vehicles.

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⟦(6) The Administrator shall determine the feasibility and desirability of requiring new motor vehicles to utilize onboard hydrocarbon control technology which would avoid the necessity of gasoline vapor recovery of uncontrolled emissions emanating from the fueling of motor vehicles. The Administrator shall compare the costs and effectiveness of such technology to that of implementing and maintaining vapor recovery systems (taking into consideration such factors as fuel economy, economic costs of such technology, administrative burdens, and equitable distribution of costs). If the Administrator finds that it is feasible and desirable to employ such technology, he shall, after consultation with the Secretary of Transporation with respect to motor vehicle safety, prescribe, by regulation, standards requiring the use of onboard hydrocarbon technology which shall not become effective until the introduction to the model year for which it would be feasible to implement such standards, taking into consideration compliance cost and the restraints of an adequate lead lime for design and production.⟧

(6) Regulations under this section applicable to vehicles manufactured during and after model year 1991 shall require the use of onboard hydrocarbon control technology to recover emissions from the fueling of such vehicles. Such onboard hydrocarbon control technology shall be designed to accommodate all available fuels.

(7)(A) To augment existing regulations controlling carbon monoxide emissions under temperatures between 68 and 86 degrees Fahrenheit, the Administrator shall prescribe regulations under paragraph (1) of this subsection applicable to emissions of carbon monoxide over a temperature range of 20–68 degrees Fahrenheit from light-duty vehicles and light-duty trucks manufactured during and after model year 1990.

(B) Regulations under subparagraph (A) shall require a reduction of at least 90 percent from the average emissions from light-duty gasoline-fueled vehicles and trucks manufactured in model year 1970 to a level not to exceed 6.2 grams per vehicle mile of carbon monoxide at 20 degrees Fahrenheit. Demonstration of compliance shall be determined under regulations promulgated by the Administrator and may be based on testing of randomly selected engine families.

(b)(1)(A) The regulations under subsection (a) applicable to emissions of carbon monoxide and hydrocarbons from light-duty vehicles and engines manufactured during model years 1977 through 1979 shall contain standards which provide that such emissions from such vehicles and engines may not exceed 1.5 grams per vehicle mile of hydrocarbons and 15.0 grams per vehicle mile of carbon monoxide. The regulations under subsection (a) applicable to emissions of carbon monoxide from light duty vehicles and engines manufactured during the model year 1980 shall contain standards which provide that such emissions may not exceed 7.0 grams per vehicle mile. The regulations under subsection (a) applicable to emissions of hydrocarbons from light-duty vehicles and engines manufactured during or after model year 1980 shall contain standards which require a reduction of at least 90 percent from emissions of such pollutant allowable under the standards under this section applicable to light-duty-vehicles and engines manufactured in model year 1970. Unless waived as provided in paragraph (5), regulations under subsection (a) applicable to emissions of carbon monoxide from light duty vehicles and engines manufactured during or after the model year 1981 shall contain standards which require a reduction of at least 90 percent from emissions of such pollutant allowable under the standards under this section applicable to light-duty vehicles and engines manufactured in model year 1970. *The regulations under subsection (a) applicable to emission of hydrocarbons from light-duty vehicles and engines manufactured during and after model year 1992 shall contain standards which provide that such emissions may not exceed 0.25 gram per vehicle mile.*

(B) The regulations under subsection (a) applicable to emissions of oxides of nitrogen from light-duty vehicles and engines manufactured during model years 1977 through 1980 shall contain standards which provide that such emissions from such vehicles and engines may not exceed 2.0 grams per vehicle mile. The regulations under subsection (a) applicable to emissions of oxides of nitrogen from light-duty vehicles and engines manufactured during the model year 1981 and thereafer shall contain standards which provide that such emissions from such vehicles and engines may not exceed 1.0 gram per vehicle mile. The Administrator shall prescribe standards in lieu of those required by the preceding sentence which provide that emissions of oxides of nitrogen may not exceed 2.0 grams per vehicle mile for any light-duty vehicle manufactured during models years 1981 and 1982 by any manufacturer whose production, by corporate identity, for calendar year 1976 was less than three hundred thousand light-duty motor vehicles worldwide if the Administrator determines that—

(i) the ability of such manufacturer to meet emission standards in the 1975 and subsequent model years was, and is, primarily dependent upon technology developed by other manufacturers and purchased from such manufacturers; and

(ii) such manufacturer lacks the financial resources and technological ability to develop such technology.

The regulations under subsection (a) applicable to emissions of oxides of nitrogen from light-duty vehicles and engines manufactured during and after model year 1990 shall contain standards which provide that such emissions may not exceed 0.4 gram per vehicle mile.

* * * * * * *

(D) The Administrator shall promulgate regulations under subsection (a) applicable to emissions of particulates from light-duty vehicles and engines manufactured during and after model year 1990, and such regulations shall contain standards which provide that such emissions, may not exceed 0.08 gram per vehicle mile.

(E) The Administrator shall promulgate regulations under subsection (a) applicable to emissions of formaldehyde from light-duty vehicles and engines manufactured during and after model year 1990 which may be fueled, in whole or in part, by fuels other than gasoline. In no event may such regulations permit emissions of formaldehyde at a higher rate than from comparable gasoline-fueled vehicles.

* * * * * * *

(d) The Administrator shall prescribe regulations under which the useful life of vehicles and engines shall be determined for purposes of subsection (a)(1) of this section and section 207. Such regulations shall provide that useful life shall—

(1) in the case of light duty vehicles and light duty vehicle engines, be a period of use of [five years or of fifty thousand miles] *ten years or of one hundred thousand miles* (or the equivalent), whichever first occurs;

(2) in the case of any other motor vehicle or motor vehicle engine (other than motorcycles or motorcycle engines) be a period of use set forth in paragraph (1) unless the Administrator determines that a period of use of greater duration or mileage is appropriate; and

(3) in the case of any motorcycle or motorcycle engine, be a period of use the Administrator shall determine.

* * * * * * *

(g) The Administrator shall promulgate regulations applicable to motor vehicle and other engines manufactured during and after model year 1991 that prohibit the manufacture, sale, or introduction into commerce of any engine that requires leaded gasoline.

(h) Each emission standard under this section shall apply to and be met by each and every vehicle or engine sold, offered for sale, introduced into commerce, or imported, and may not be met or complied with by the average of the performance of various vehicles, engines, engine families, or models manufactured by the same manufacturer.

PROHIBITED ACTS

SEC. 203. (a)(1) * * *

* * * * * * *

[(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser; or

[(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles, knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser; or]

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any person knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser, except as may be temporarily necessary in the course of routine proper maintenance; or

(B) for any person to manufacture or sell, or offer to sell, any part or component intended for use with, or as part of, any motor vehicle or motor vehicle engine, where a principal use of such part or component is to bypass, defeat, or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title, and where such part or component is being offered for sale for such use or put to such use within the specific knowledge of such person; or

(4) * * *

(A) * * *

* * * * * * *

(C) [except as provided in subsection (c)(3) of section 207,] to provide directly or indirectly in any communication to the ultimate purchaser or any subsequent purchaser that the coverage of any warranty under this Act is conditioned upon use of any part, component, or system manufactured by such manufacturer or any person acting for such manufacturer or under his control, or conditioned upon service performed by any such person, or

* * * * * * *

No action with respect to any element of design referred to in paragraph (3) (including any adjustment or alteration of such element) shall be treated as a prohibited Act under such paragraph (3) if such action is in accordance with section 215. Nothing in paragraph (3) shall be construed to require the use of manufacturer parts in maintaining or repairing any motor vehicle or motor vehicle engine. For the purposes of the preceding sentence, the term "manufacturer parts" means, with respect to a motor vehicle engine, parts produced or sold by the manufacturer of the motor vehicle or motor vehicle engine. *Paragraph (4)(C) shall not apply to the provision of any communication regarding any part, component, or system, or service provided without charge under the terms of the purchase agreement.*

(c) Upon application therefor, the Administrator may exempt from section 203(a)(3) any vehicles (or class thereof) manufactured before the 1974 model year [from section 203(a)(3)] for the purpose of permitting modifications to the emission control device or system of such vehicle in order to use fuels other than those specified in certification testing under section 206(a)(1), if the Administrator, on the basis of information submitted by the applicant, finds that such modification will not result in such vehicle 202 applicable to such vehicle or engine. Any such exemption, (2) the specific nature of the modification, and (3) the person or class of persons to whom the exemption shall apply.

* * * * * * *

PENALTIES

[SEC. 205. Any person who violates paragraph (1), (2), or (4) of section 203(a) or any manufacturer, dealer, or other person who violates paragraph (3)(A) of section 203(a) shall be subject to a civil penalty of not more than $10,000 . Any person who violates paragraph (3)(B) of such section 203(a) shall be subject to a civil penalty of not more than $2,500. Any such violation with respect to paragraph (1), (3), or (4) of section 203(a) shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine.]

SEC. 205. (a) Any person who violates paragraph (1), (2), or (4) of section 203(a) or any manufacturer or dealer who violates paragraph (3)(A) of section 203(a) shall be subject to a civil penalty of not more than $10,000. Any other person who violates paragraph (3)(A) of section 203(a) or any person who violates paragraph (3)(B) of section 203(a) shall be subject to a civil penalty of not more than $2,500. Any such violation with respect to paragraph (1), (3), or (4) of section 203(a) shall constitute a separate offense with respect to each motor vehicle or motor vehicle engine.

(b) A civil penalty for a violation of section 203 shall be assessed by the Administrator by an order made on the record after opportunity for a hearing. In connection with any proceeding under this section the presiding officer may issue subpoenas for the attendance and testimony of witnesses and the production of papers, books, and documents.

(c) In determining the amount of a civil penalty, the Administrator shall take into account the gravity of the violation, the size of the violator's business, the violator's history of compliance, action taken to remedy the violation, and the effect of the penalty on the violator's ability to continue in business.

(d) If any person fails to pay a civil penalty assessed under this section—

> *(1) after the order making the assessment has become a final order and if such person does not file a petition for judicial review of the order in accordance with section 307, or*
>
> *(2) after a court in any action brought for judicial review has entered a final judgment in favor of the Administrator or the action has otherwise been terminated if such person has filed a petition for review under section 307,*

the Attorney General shall recover the amount assessed (plus interest from the date of the expiration of sixty days from the date of the order, or from the date of such final judgment, as the case may be) in an action brought in any appropriate district court for the United States. In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.

MOTOR VEHICLE AND MOTOR VEHICLE ENGINE COMPLIANCE TESTING AND CERTIFICATION

SEC. 206. (a)(1) * * *

* * * * * * *

(4) Not later than one year after the enactment of this paragraph, the Administrator shall promulgate regulations adding an idle test mode to the Federal Test Procedure for light-duty vehicles as in effect on such date of enactment. Such modified test procedure shall be used for the certification of light-duty vehicles and engines manufactured during or after model year 1990.

* * * * * * *

(b)(1) * * *
(2)(A)(i) * * *

* * * * * * *

(iii) A certificate of conformity shall be suspended or revoked under clause (i) with respect to a class or subclass of vehicles if that class or subclass fails a sampling plan having an acceptance quality level of 10 percent.

COMPLIANCE BY VEHICLES AND ENGINES IN ACTUAL USE

SEC. 207. (a)(1) * * *

* * * * * * *

(3) The cost of any part, device, or component of any light-duty vehicle that is designed for emission control and which in the instructions issued pursuant to subsection (c)(3) of this section is scheduled for replacement during the useful life of the vehicle in order to maintain compliance with regulations under section 202 of this Act, the failure of which shall not interfere with the normal performance of the vehicle, and the expected retail price of which, including installation costs, is greater than 2 percent of the suggested retail price of such vehicle, shall be borne or reimbursed at the time of replacement by the vehicle manufacturer and such replacement shall be provided without cost to the ultimate purchaser, subsequent purchaser, or dealer. [The term "designed for emission control" as used in the preceding sentence means a catalytic converter, thermal reactor, or other component installed on or in a vehicle for the sole or primary purpose of reducing vehicle emissions (not including those vehicle components which were in general use prior to model year 1968 and the primary function of wich is not related to emission control).] *The term "designed for emission control" as used in the preceding sentence means a catalytic converter, thermal reactor, trap oxidizer, oxygen sensor, air pump, air flow sensor, electronic control unit and other elements of a fuel metering system, exhaust gas recirculation system, evaporative emission control system, and altitude compensation system, or any other component that is first installed on or in a vehicle in mass production after the date of enactment of the Clean Air Standards Attainment Act of 1987 and that is installed for the primary purpose of reduc-*

ing vehicle emissions. Such term shall not include those vehicle components which were in general use prior to model year 1968.

* * * * * * *

(b) If the Administrator determines that (i) there are available testing methods and procedures to ascertain whether, when in actual use throughout its useful life (as determined under section 202(d)), each vehicle and engine to which regulations under section 202 apply complies with the emission standards of such regulations, (ii) such methods and procedures are in accordance with good engineering practices, and (iii) such methods and procedures are reasonably capable of being correlated with tests conducted under section 206(a)(1), then—

(1) he shall establish such methods and procedures by regulation, and

(2) at such time as he determines that inspection facilities or equipment are available for purposes of carrying out testing methods and procedures established under paragraph (1), he shall prescribe regulations which shall require manufacturers to warrant the emission control device or system of each new motor vehicle or new motor vehicle engine to which a regulation under section 202 applies and which is manufactured in a model year beginning after the Administrator first prescribes warranty regulations under this paragraph. The warranty under such regulations shall run to the utimate purchaser and each subsequent purchaser and shall provide that if—

(A) the vehicle or engine is maintained and operated in accordance with instructions under subsection (c)(3),

(B) it fails to conform at any time during its useful life (as determined under section 202(d)) to the regulations prescribed under section 202, and

(C) such nonconformity results in the ultimate purchaser (or any subsequent purchaser) of such vehicle or engine having to bear any penalty or other sanction (including the denial of the right to use such vehicle or engine) under State or Federal law,

then such manufacturer shall remedy such nonconformity under such warranty with the cost thereof to be borne by the manufacturer. No such warranty shall be invalid on the basis of any past used in the maintenance or repair of a vehicle or engine if such part was certified as provided under subsection (a) (2). For purposes of the warranty under this subsection, for the period after twenty-four months or twenty-four thousand miles (whichever first occurs) the term "emission control device or system" means a [catalytic converter, thermal reactor, or other component installed on or in a vehicle for the sole or primary purpose of reducing vehicle emissions. Such terms shall not include those vehicle components which were in general use prior to model year 1968.] *trap oxidizer, oxygen sensor, air pump, air flow sensor, electronic control unit and other elements of a fuel metering system, exhaust gas recirculation system, evaporative emission control system, and altitude compensation system, or any other component that is first installed on or in a vehicle in mass production after the date of* *enactment of the Clean Air Standards Attainment Act of 1987 and that is installed for the primary purpose of reducing vehicle emissions.*

(c) Effective with respect to vehicles and engines manufactured during model years beginning more than 60 days after the date of enactment of the Clean Air Amendments of 1970—

(1) If the Administrator determines that a substantial number of any class or category of vehicles or engines, although **[**properly**]** *normally* maintained and used, do not conform to the regulations prescribed under section 202, when in actual use throughout their useful life (as determined under section 202(d)), he shall immediately notify the manufacturer thereof of such nonconformity, and he shall require the manufacturer to submit a plan for remedying the noncomformity of the vehicles or engineers with respect to which such notification is given. The plan shall provide that the nonconformity of any such vehicles or engines which are **[**properly**]** *normally* used and maintained will be remedied at the expense of the manufacturer. If the manufacturer disagrees with such determination of nonconformity and so advise the Administrator, the Administrator shall afford the manufacturer and other interested persons an opportunity to present their views and evidence in support thereof at a public hearing. Unless, as a result of such hearing the Administrator withdraws such determination of nonconformity, he shall, within 60 days after the completion of such hearing, order the manufacturer to provide prompt notification of such nonconformity in accordance with paragraph (2).

* * * * * * *

(3)(A) * * *

(B) The instruction under subparagraph (A) of this paragraph shall not include any condition on the ultimate purchaser's using, in connection with such vehicle or engine, any component or service (other than a component or service provided without charge under the terms of the purchase agreement) which is identified by brand, trade, or corporate name; or directly or indirectly distinguishing between service performed by the franchised dealers of such manufacturer or any other service establishments with which such manufacturer has a commercial relationship, and service performed by independent automotive repair facilties with which such manufacturer has no commercial relationship.**[**; except that the prohibition of this subsection may be waived by the Administrator if—

[(i) the manufacturer satisfies the Administrator that the vehicle or engine will function properly only if the component or service so identified is used in connection with such vehicle or engine, and

[(ii) the Administrator finds that such a waiver is in the public interest.**]**

* * * * * * *

(4) In making determinations of nonconformity under this subsection, the Administrator shall take into account information collect-

ed under any State vehicle emission control inspection and maintenance program. Any State in which such a program is operating may petition the Administrator to make a determination of nonconformity under paragraph (1) on the basis of information collected in such program. The Administrator shall act upon such petition within sixty days of receipt of such petition.

(5) For the purpose of paragraph (1), the phrase "normally maintained and used" means the maintenance and use ordinarily to be expected in the hands of the ultimate purchasers, not necessarily in accordance with instructions under paragraph (3), but not including intentional misfueling or intentional violations of section 203(a)(3).

(6) Not later than 180 days after enactment of the Clean Air Standards Attainment Act of 1987, the Administrator shall establish at least one testing center in addition to the existing two testing centers, which shall be located at a site that represents high altitude conditions, to ascertain whether, when in actual use throughout their useful life (as determined under section 202(d)), each class or category of vehicle and engine to which regulations under section 202 apply conforms to the emission standards of such regulations. The Administrator shall, in cooperation with the States, conduct routine testing of a representative sample of classes or categories of vehicles and engines to which regulations under section 202 apply. In carrying out such tests, the Administrator shall assure that the testing procedures and methods are of sufficient accuracy and consistency to carry out the purposes of this section. For the purposes of this paragraph, the term "high altitude conditions" refers to high altitude as defined in Environmental Protection Agency regulations in effect as of the enactment of this Act.

(7) The Administrator shall promulgate regulations requiring each State which is required to implement a vehicle inspection and maintenance program to adopt quality control audits to assure that such inspections detect and report to the Administrator any patterns of defects in any manufacturer's emission control systems. The Administrator shall annually report to the Congress, with respect to each manufacturer, any significant finding of repeated or common emission system defects and the actions taken to remedy such nonconformity through ordered or voluntary recalls or other actions authorized by this Act.

* * * * * * *

(e)*(1)* If a manufacturer includes in any advertisement a statement respecting the cost or value of emission control devices or systems, such manufacturer shall set forth in such statement the cost or value attributed to such devices or systems by the Secretary of Labor (through the Bureau of Labor Statistics). The Secretary of Labor, and his representatives, shall have the same access for this purpose to the books, documents, papers, and records of a manufacturer as the Comptroller General has to those of a recipient of assistance for purposes of section 311.

(2)(A) Each manufacturer of a new motor vehicle shall affix, and each dealer shall maintain, on each motor vehicle manufactured during and after model year 1990, a label indicating the full cost of applying the warranty under subsections (a) and (b) to such new motor vehicle. The form and content of such label, and the manner

in which such label shall be affixed, shall be prescribed by the Administrator by rule, except that every such label shall contain, in bold face type, the following statement: "The vehicle manufacturer or dealer may offer to sell warranties extending beyond those required by section 207 (a) and (b) of the Clean Air Act and covering the emission system or other components or parts of the vehicle. The purchaser of the vehicle does not have any obligation to purchase the extended warranty from the manufacturer or the dealer. The vehicle purchaser may elect to buy an extended warranty from any other vendor of such warranties."

(B) The Administrator may permit a manufacturer to comply with the provisions of subparagraph (A) by permitting such manufacturer to disclose the information required under this paragraph on the label required under section 3 of the Automobile Information Disclosure Act (15 U.S.C. 1232).

(C) A violation of subparagraph (A) shall be treated as a violation of section 3 of the Automobile Disclosure Act (15 U.S.C 1232).

(D) The Administrator shall utilize the authorities of section 208 of this Act to verify the costs disclosed by each manufacturer under subparagraph (A).

* * * * * * *

[(g) For the purposes of this section, the owner of any motor vehicle or motor vehicle engine warranted under this section is responsible in the proper maintenance of such vehicle or engine to replace and to maintain, at his expense at any service establishment or facility of his choosing, such items as spark plugs, points, condensers, and any other part, item, or device related to emission control (but not designed for emission control under the terms of the last three sentences of section 207(a)(1), unless such part, item, or device is covered by any warranty not mandated by this Act.]

(g) For the purposes of this section, the owner of any motor vehicle or motor vehicle engine warranted under this section is responsible in the proper maintenance of such vehicle or engine to replace and to maintain, at his expense and at any service establishment or facility of his choosing, such items as spark plugs, points, condensers, and any other part, item, or device related to emission control (but not designed for emission control under the last two sentences of subsection (a)(3)), unless such part, item, or device is covered by any warranty not required by this Act.

STATE STANDARDS

SEC. 209. (a) * * *

(b)(1) The Administrator shall, after notice and opportunity for public hearing, waive application of this section to any State which has adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles or new motor vehicle engines porior to March 30, 1966, if the State determines that the State standards will be[, in the aggregate,] at least as protective of public health and welfare as applicable Federal standards. No such waiver shall be granted if the Administrator finds that—

(A) the determination of the State is arbitrary and capricious,

(B) such State does not need such State standards to meet compelling and extraordinary conditions, or

(C) such State standards and accompanying enforcement procedures are not consistent with section 202(a) of this part.

REGULATION OF FUELS

SEC. 211. (a) * * *

* * * * * * *

(c)(1) * * *

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(5) Regulations under this subsection shall prohibit any person from introducing, or causing or allowing the introduction, of a regulated fuel or fuel additive into a motor vehicle not designed for such fuel or fuel additive.

[(d) Any person who violates subsection (a) or (f) or the regulations prescribed under subsection (c) or who fails to furnish any information required by the Administrator under subsection (b) shall forfeit and pay to the United States a civil penalty of $10,000 for each and every day of the continuance of such violation, which shall accure to the United States and be recovered in a civil suit in the name of the United States, brought in the district where such person has his principal office or in any district in which he does business. The Administrator may, upon application therefor, remit or mitigate any forfeiture provided for in this subsection and he shall have authority to determine the facts upon all such applications.]

(d)(1) Any person who violates subsection (a), (f), (h) or (j) or the regulations prescribed under subsection (c), (h) or (i) or who fails to furnish any information required by the Administrator under subsection (b) shall be subject to a civil penalty of not more than $10,000 for each and every day of such violation. Such civil penalty shall be assessed by the Administrator by an order made on the record after opportunity for a hearing. In connection with any proceeding under this section the presiding officer may issue subpoenas for the attendance and testimony of witnesses and the production of papers, books, and documents.

(2) In determining the amount of a civil penalty, the Administrator shall take into account the gravity of the violation, the size of the violator's business, the violator's history of compliance, action taken to remedy the violation, and the effect of the penalty on the violator's ability to continue in business.

(3) If a person fails to pay a civil penalty assessed under this subsection—

(A) after the order making the assessment has become a final order and if such person does not file a petition for judicial review of the order in accordance with section 307, or

(B) after a court in any action brought for judicial review has entered a final judgment in favor of the Administrator or the action has otherwise been terminated if such person has filed a petition for review under section 307,

the Attorney General shall recover the amount assessed (plus interest from the date of the expiration of sixty days from the date of the *order, or from the date of such final judgment, as the case may be) in an action brought in any appropriate district court for the United States. In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.*

* * * * * * *

(h)(1) After July 1, 1990, the sale or introduction into commerce of diesel fuel for use in motor vehicles, which fuel has a sulfur content in excess of 0.05 per centum by weight, shall be prohibited.

(2) The fuel required to be used in certification of heavy duty diesel vehicles and engines manufactured during and after model year 1991 shall have a sulfur content that does not exceed 0.05 per centum by weight.

(3)(A) Paragraph (1) of this subsection and any regulations promulgated by the Administrator thereunder shall not require a small refinery to reduce the sulfur content of diesel fuel to 0.05 per centum by weight prior to July 1, 1993.

(B) For the purpose of this subsection, the term "small refinery" means a refinery—

> *(i) the diesel fuel producing capacity of which was in operation or under construction at any time during the one-year period immediately preceeding October 1, 1987,*
>
> *(ii) which has a crude oil or bonafide feed stock capacity (as determined by the Administrator) of 175,000 barrels per day or less, and*
>
> *(iii) which is owned or controlled by a refiner with a total combined crude oil or bonafide feed stock capacity (as determined by the Administrator) of 350,000 barrels per day or less.*

(4) The Administrator shall report to the Congress not later than the date six months after the enactment of this subsection, on whether a sulfur content in diesel fuel of 0.05 per centum by weight is necessary to assure that heavy-duty diesel vehicles and engines can achieve the particulate emission standards specified in section 202(a)(3)(F) or in regulations under section 202 for model year 1991 and model year 1994, or is otherwise warranted for the protection of public health.

(i) Not later than two years after the date of enactment of this subsection, the Administrator shall promulgate regulations under this subsection requiring that the Reid vapor pressure of gasoline sold, offered for sale, or introduced into commerce during warm weather months (as defined by the Administrator), shall not exceed nine pounds per square inch, or with respect to any region established under section 178, any lower level requested by the regional commission for such region established under section 178(b). After April 1, 1990, no manufacturer or importer of gasoline may sell, offer for sale, or introduce into commerce any fuel which does not comply with such regulations. For ethanol/gasoline blends containing 10 percent denatured anhydrous ethanol, the Reid vapor pressure limitations promulgated pursuant to this subsection shall be 1.0 pound per square inch greater than the applicable Reid vapor pressure limitations which apply to gasoline: Provided, however, That a refiner, distributor, blender, marketer, reseller, carrier, retailer, or wholesale purchaser-consumer shall be deemed to be in full compliance with the provisions of this subsection and the regu-

lations promulgated thereunder if it can demonstrate (by showing receipt of a certification or other evidence acceptable to the Administrator) that (I) the gasoline portion of the blend complies with the Reid vapor pressure limitations promulgated pursuant to this subsection, and (II) the ethanol portion of the blend does not exceed its waiver condition under subsection (f)(4).

(j)(1) After October 1, 1989, the sale or introduction into commerce of gasoline for use in motor vehicles, in any area that is a nonattainment area as defined in section 171(2) for carbon monoxide, during the period from October 1 to April 1 of each year, which fuel has an oxygen content less than 2 per centum oxygen by weight, shall be prohibited.

(2) After October 1, 1990, the sale or introduction into commerce of gasoline for use in motor vehicles, in any area that is a nonattainment area as defined in section 171(2) for carbon monoxide during the period from October 1 to April 1 of each year, which fuel has an oxygen content less than 3.7 per centum oxygen by weight, shall be prohibited.

(3) The Administrator may waive the requirements of paragraph (1) or (2) in whole or in part with respect to the level of oxygen content, the timing of available of oxygenated gasoline, or the use of oxygenated fuels, in a specific area, where full implementation of such provision may reasonably be anticipated to result in an unacceptable increase in levels of other air pollutants.

(4) Not later than two years after the enactment of this subsection, the Administrator shall submit a report to the Environment and Public Works Committee of the United States Senate and the Energy and Commerce Committee of the House of Representatives concerning the increased use of oxygenated fuels nationwide; and the use of oxygenated fuels with an oxygen content by weight greater than 3.7 per centum. Such report shall include an analysis of emissions, drivability, fuel volatility and availability of gasoline with increased oxygen levels.

* * * * * * *

DEFINITIONS

SEC. 302. (a) * * *

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(h) All language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on *precipitation,* economic values and on personal comfort and well-being, *whether caused by transformation, conversion, or combination with other pollutants.*

CITIZEN SUITS

SEC. 304. (a) Except as provided in subsection (b), any person may commence a civil action on his own behalf—

(1) against any person (including (i) the United States, and (ii) any other governmental instrumentality or agency to the extent permitted by the Eleventh Amendment to the Constitu-

tion) who is alleged to be in violation of (A) an emission standard or limitation under this Act, or (B) an order issued by the Administrator or a State with respect to such a standard [or] limitation, *or (C) section 126,*

* * * * * * *

AN ACT To provide technical and financial assistance for the development of management plans and facilities for the recovery of energy and other resources from discarded materials and for the safe disposal of discarded materials, and to regulate the management of hazardous waste

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

* * * * * * *

TITLE II—SOLID WASTE DISPOSAL

* * * * * * *

Subtitle D—State or Regional Solid Waste Plans

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MUNICIPAL INCINERATOR ASH

SEC. 4011. (a)(1) Not later than one year after the date of enactment of this section, the Administrator shall promulgate regulations for the management, handling, treatment, transportation, reuse, recycling, and disposal of ash from municipal waste incineration units that meet the requirements of section 3001(i)(1) and (2), as may be necessary to protect human health and the environment. Notwithstanding other provisions of this Act, the management, handling, storage, treatment, transportation, reuse, recycling, and disposal of ash from municipal waste incineration units that meet the requirements of section 3001(i)(1) and (2) shall be subject to this section and subtitle and not subject to the provisions of subtitle C.

(2) For the purposes of this section, the term "municipal waste incineration unit" shall have the meaning given in section 131(k)(1) of the Clean Air Act.

(3) Regulations promulgated under this subsection may establish requirements that apply to fly ash separately, to bottom ash separately, or to the combination of fly ash and bottom ash.

(b)(1) Regulations promulgated under subsection (a) for the disposal of ash from municipal waste incineration units in landfills shall require—

(A) the installation of two or more liners and a leachate collection system above and between such liners, in accordance with paragraph (2); and

(B) groundwater monitoring.

(2) The requirement of paragraph (1)(A) may be satisfied by the installation of a top liner designed, operated, and constructed of materials to prevent the migration of any constituent into such liner during the period such facility remains in operation (including any post-closure monitoring period), and a lower liner designed, operated, and constructed to prevent the migration of any constituent through such liner during such period. For the purpose of the pre-

ceding sentence, a lower liner shall be deemed to satisfy such requirement if it is constructed of at least a 3-foot thick layer of recompacted clay or other natural material with a hydraulic conductivity of no more than 1 x 10^{-7} centimeter per second. The provisions of this paragraph apply prior to and after the promulgation of regulations under paragraph (1).

(3) Except as provided in subsection (d)(3), the requirement of paragraph (1)(A) may be satisfied by the placement of ash from municipal waste incineration units in a monofill, located, designed, and operated so as to assure that there will be no migration of any constituent into groundwater or surface water at any future time, and the installation of a single liner designed, operated, and constructed of materials to prevent the migration of any constituent into such liner during such period as the facility remains in operation, including any post-closure monitoring period.

(c) Regulations promulgated under subsection (a) may allow disposal of bottom or combined ash from municipal waste incineration units in sanitary landfills meeting the requirements of revised criteria promulgated under section 4010(c), if such ash has undergone treatment (as defined in section 1004(34)) in accordance with regulations for such treatment promulgated under this section. For the purposes of this section, the mixing of fly ash and bottom ash, or the mixing of such ash with other solid waste, without the introduction of chemical stabilization agents, does not constitute treatment.

(d)(1) For the purposes of developing regulations for the management, handling, storage, treatment, transportation, reuse, and disposal of ash from municipal waste incineration units under this section that protect human health and the environment, the Administrator shall promulgate criteria and testing procedures for identifying the characteristics of ash from municipal waste incineration units that may pose a hazard to human health or the environment. In considering potential hazards to human health and the environment, the Administrator shall consider all potential pathways of human or environmental exposure to constituents of such ash, including, but not limited to, inhalation, ingestion as a consequence of incorporation of the ash or any constituent into the food chain, ingestion of potable water or aquatic organisms contaminated by surface runoff, leaching or percolation of such ash or its constituents into groundwater or surface water, ingestion or inhalation of soil particles contaminated with such ash, and dermal contact with such ash (including, for all such pathways, situations of disposal or reuse). At a minimum, the Administrator shall consider appropriate methods to determine leaching, total chemical analysis, respirability, and toxicity.

(2) The Administrator may require the owner or operator of any municipal waste incineration unit or any facility handling, transporting, storing, treating, reusing, recycling, or disposing of ash from such unit to test such ash in accordance with the criteria and testing procedures promulgated under this subsection. If fly ash and bottom ash are combined, such combined ash must also be tested in accordance with such criteria and testing procedures, including, as the Administrator determines necessary, the separate testing of bottom ash and fly ash.

(3) Any ash which fails in any characteristic under the criteria and testing procedures promulgated by the Administrator under this subsection shall be disposed of in a facility with two or more liners and leachate collection system above and between such liners in accordance with subsection (b)(1), or shall be treated (as defined in section 1004(34)) in accordance with regulations promulgated under subsection (a), and shall not be reused.

(e)(1) Any facility receiving ash from municipal waste incineration units for the purpose of treatment, storage, reuse, recycling, or disposal shall be subject to a permit program or other system of prior approval and conditions in accordance with section 4005(c).

(2) For the purposes of this section and section 3008, the term "requirement of this subtitle" shall be deemed to include any requirement or regulation under this section.

(f) Before the issuance of a permit or other prior approval to any person with respect to any facility for treatment, storage, reuse, recycling or disposal of incinerator ash, the Administrator shall provide for public notice and the opportunity for an informal public hearing, in accordance with the provisions of section 7004(b)(2) of this Act.

(g)(1) Whenever on the basis of any information the Administrator determines that there is or has been a release of any hazardous constituent from a facility regulated under this section, the Administrator may issue an order requiring corrective action or such other response measure as he deems necessary to protect human health or the environment or the Administrator may commence a civil action in the United States district court in the district in which the facility is located for appropriate relief, including a temporary or permanent injunction.

(2) Any order issued under this subsection may include a suspension or revocation of authorization to operate, shall state with reasonable specificity the nature of the required corrective action or other response measure, and shall specify a time for compliance. If any person named in an order fails to comply with the order, the Administrator may assess, and such person shall be liable to the United States for, a civil penalty in an amount not to exceed $25,000 for each day of noncompliance with the order.

(3) Regulations promulgated under subsection (a) shall require corrective action for all releases of hazardous constituents from any solid waste management unit at a facility seeking a permit under subsection (e), regardless of the time at which waste was placed in such unit. Permits issued under this section shall contain schedules of compliance for such corrective action and assurances of financial responsibility for completing such corrective action.

(h) Regulations promulgated under subsection (a) shall establish requirements for the proper closure of facilities treating, storing, or disposing of ash from municipal waste incineration units, for the post-closure monitoring and care of such facilities, and for assurances of financial responsibility for corrective action.

OUTER CONTINENTAL SHELF LANDS ACT

SEC. 204. (a) * * *

The regulations prescribed by the Secretary under this subsection shall include, but not be limited to, provisions—

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(8) for compliance with the national ambient air quality standards pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.), to the extent that activities authorized under this Act significantly affect the air quality of any State*, until such time as the Administrator of the Environmental Protection Agency has promulgated regulations under section 129 of the Clean Air Act.*

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